SIEMENS

DTU3005-P

Intelligent Data Transfer Device for Profibus
Operator's Manual

⚠ DANGER

Hazardous voltages and high-speed moving parts in electrical devices communicating with the Data Transfer Unit.

Can cause death, serious injury or property damage.

See safety instruction contained herein. **Restrict use to qualified personnel.**

The use of unauthorized parts in the repair of the equipment or tampering by unqualified personnel will result in dangerous conditions that can cause death, serious injury or property damage.

IMPORTANT

The information contained herein is general in nature and not intended for specific application purposes. It does not relieve the user of responsibility to use sound practices in application, installation, operation, and maintenance of the equipment purchased. Siemens reserves the right to make changes at any time without notice or obligations. Should a conflict arise between the general information contained in this publication and the contents of drawings or supplementary material or both, the latter shall take precedence.

QUALIFIED PERSONNEL

For the purposes of this manual and product labels, "qualified personnel" is one who is familiar with the installation, construction, or operation of the equipment and the hazards involved. In addition, s/he has the following qualifications:

(a) **is trained and authorized** to energize, de-energize, clear, ground, and tag circuits and equipment in accordance with established safety practices.

(b) **is trained** in the proper care and use of protective gear equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety procedures

(c) **is trained** in rendering first aid.

SUMMARY

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens Energy & Automation, Inc. sales office.
THE CONTENTS OF THIS INSTRUCTION MANUAL SHALL NOT BECOME PART OF OR MODIFY ANY PRIOR OR EXISTING AGREEMENT, COMMITMENT OR RELATIONSHIP. THE SALES CONTRACT CONTAINS ALL OBLIGATIONS OF SIEMENS ENERGY & AUTOMATION, INC. THE WARRANTY CONTAINED IN THE CONTRACT BETWEEN THE PARTIES IS THE SOLE WARRANTY OF SIEMENS ENERGY & AUTOMATION, INC.

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Siemens maintains control of all specifications for the SEAbus and SEAbus Plus protocols. A modification to a protocol for any type of device must be approved by Siemens Energy & Automation, Inc. to guarantee compatibility. Any changes made must be backward compatible so that existing products can coexist on the communications bus without having to support the newer features of the protocol

Siemens continuously strives to ensure backward compatibility, reliability, and easy implementation of both protocols to meet current market communications requirements. Siemens therefore reserves the right to make improvements including changes to specifications at any time without notice or obligation.

1 Introduction

1.1 Product Overview

The DTU3005P is an intelligent, multiple-function data transfer unit that enables communications between Siemens communicating power meters, trip units, protective relays, and Profibus DP networks. The device (shown below in **Figure 1.1**) is designed for the harsh industrial environment and is suited for use in electrical equipment.

The device is powered from an external power supply. Three ports allow for connection to the Siemens ACCESS devices, Siemens Protective Relays device, the Profibus network, and a passthrough, which allows direct communications with Port 2 to Siemens ACCESS devices. Status lights indicate proper operation and DIP Switches allow access to programming and diagnostic modes.

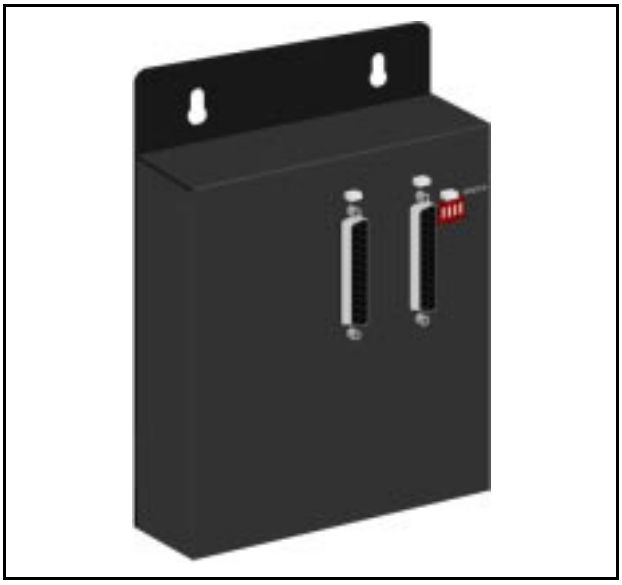

Figure 1.1 Panel-Tec DTU3005P

The DTU3005P device supports a wide variety of Siemens ACCESS devices and 7-series numerical protection relays. **Appendix A** lists the supported Siemens ACCESS devices.

1.2 Software Overview

The DTU3005P Editor software is a DOS based program used to configure the DTU3005P device. It provides for uploading and downloading configurations via the computer's serial port. Using the software, you can edit and save configurations in project files on your computer's hard drive. **Chapters 2** through **6** discuss installing and using the editor software to configure your DTU3005P device.

1.3 Features

Device Features:

- Supports 12 Siemens ACCESS devices
- Supports 11 Siemens Protective Relay devices
- Passthrough port for connection to a supervisory computer
- Baud rates up to 187,500 bps
- Compact size (8" x 6" x 1")
- Steel housing
- Keyhole mounting at top
- Weighs 2 lbs.
- 0° to +70° C operational temperature
- -100° to +125° C storage temperature (non-condensing)

Editor Software Features:

- DOS based
- Menu driven
- Mouse supported (but not required)

1.4 Getting Started

To integrate the DTU3005P into your system, verify that you have all of the following components:

Supplied by User:

- 9-35VDC Power Supply

Supplied by Siemens:

- Port 2 cable (DB25M to shield twisted pair)
- Power Supply Terminal (3-pin)
- DB25F to DB9 Null modem cable for programming via Port 3
- 3-1/2" diskette with Editor software
- 3-1/2" diskette with DTU3005P GSD file*

* GSD file — a file that describe the Profibus device configuration and parameters (i.e. I/O map, data type, etc.). This file is required by the Profibus configuration tool like (ComProfibus) to setup the slave parameters. Those files are supplied with the device manufacturer; the DTU3005P GSD file is supplied by Siemens Energy & Automation.

1.5 Applications

The typical application of the DTU3005P is to connect Port 1 of the DTU3005P to a Profibus DP network as a slave device, and then connect to Siemens ACCESS devices or VDEW devices using Port 2. Port 3 can be configured as a passthrough to the devices. This connection allows a personal computer running Siemens WinPM™ or other supervisory software to connect directly to SEAbus devices at the same time.

When using VDEW for the 7-series relays, the use of Port 3 (typically with DIGSI) temporarily stops Port 1's (Profibus DP Port) control of Port 2 (Device Port). Due to the rules of VDEW, Port 1 only regains control of Port 2 after communication is completely stopped on Port 3. The passthrough function is useful for using DIGSI to retrieve waveforms from 7-series relays.

Example applications are shown below in **Figure 1.2** and **Figure 1.3**.

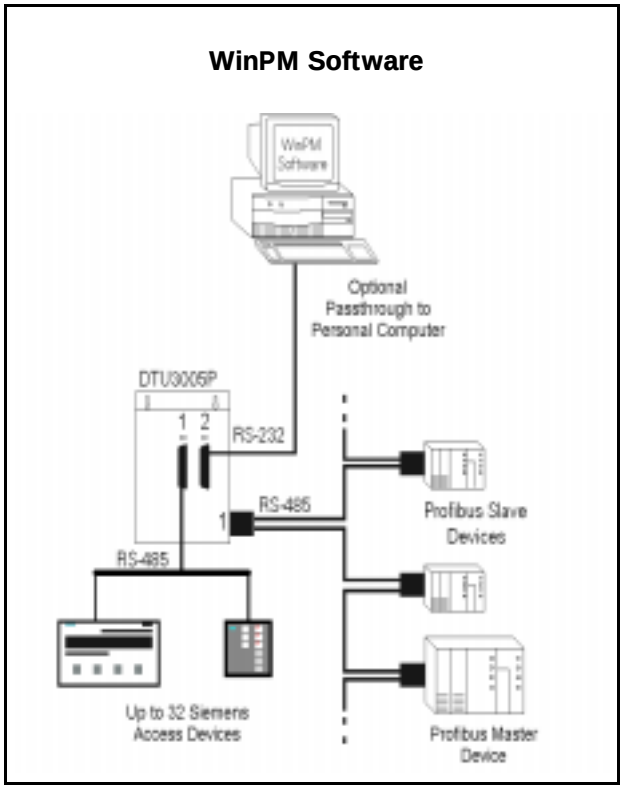

Figure 1.2 Profibus to SEAbus Application

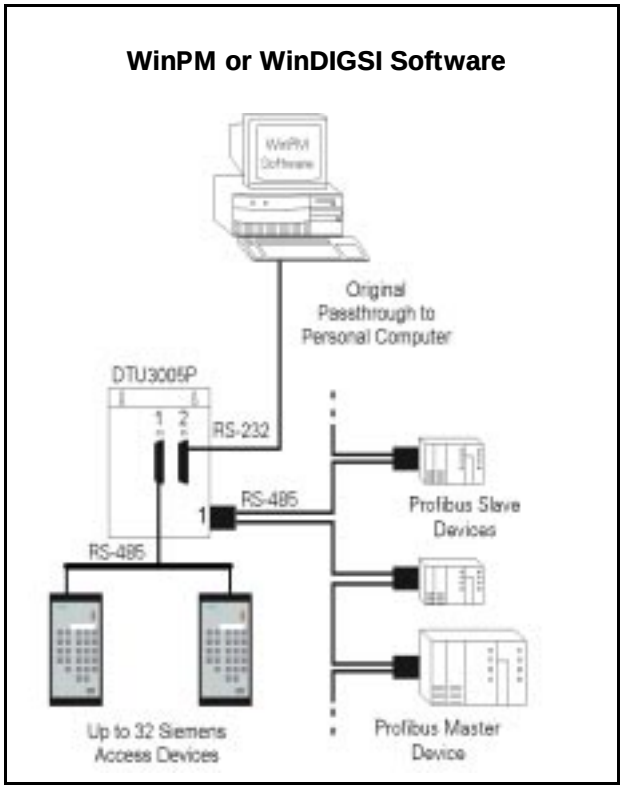

Figure 1.3 Profibus to VDEW Application

2 Installing the Software

The DTU3005P Editor software can be installed from the MS-DOS prompt on computers running Windows 95 and 98.

Note: The DTU3005P Editor software does not work in a Windows NT environment.

The PC processor must be less than 300 MHz (or have a utility program installed to slow down the processor speed) for the Editor software to work properly.

Note: For more information about the utility program, contact a Siemens representative at 800-427-2256.

To install the program, insert the installation diskette into your computer's disk drive and follow the steps listed below. The computer screen (shown in **Figure 21**), illustrates the computer prompts and user responses.

1. Select the **MS-DOS Prompt** from the **Programs** sub-menu from the **Start** button.
2. Change the current drive at the MS-DOS prompt to the diskette drive. Type **A:** (or **B:** if that is your 3½" diskette drive,) and then press **Enter**. The **A:\>** is displayed.
3. At the **A:\>** prompt, type **install**, and then press **Enter**. The installation program begins.
4. When prompted, enter the drive you want to install the program on. For most computers, this will be drive C. Type **C:** and press **Enter**.
5. The installation program then asks which subdirectory you want to install the DTU3005P Editor program in. The subdirectory is where the program and configuration files will be placed. Type the directory name, **DTU3005P**, at the prompt and press **Enter**.
6. The installation program repeats your entries and asks if the information is correct. Enter **Y** if it is correct, or **N** if it is incorrect or you have changed your mind.
7. The installation program copies the editor program files onto drive C (or the drive you specified) and returns you to the MS-DOS prompt.
8. Type **exit** to close the MS-DOS window.

```
C:\>a:

A:\>install

DTU3005P Configuration Editor Installation Program

Enter the drive letter where the editor is to be installed ==> c

Enter the subdirectory on drive C to install the editor into ==> dtu3005p

The editor will be installed from 'A:' to 'C:\DTU3005P'.
Is this Correct (Y/N) ? y

Copying Files ...
Unpacking Files ...

Installation Complete.
Enter DTU3005P to run the Configuration Editor.

C:\DTU3005P>_
```

Figure 21 Example of MS-DOS Computer Prompts

2 Installing the Software

3 Starting the Software

To start the DTU3005P Editor program, follow these steps:

1. From the **Start** button, select the **Programs** sub-menu, and then select the **MS-DOS Prompt**.

2. At the DOS prompt, which is usually **C:\>** (or **C:\WINDOWS>** if you are running a DOS prompt from Windows) type **CD \DTU3005P.** If you installed the editor program to another directory, type **CD** followed by a backslash and the full path to the program. Press **Enter** when finished.

3. At the next DOS prompt (which is **C:\DTU3005P>** if you installed the program to the suggested directory) type **DTU3005P** and then press **Enter**.

4. The DTU3005P Editor program starts. An information screen is displayed (see **Figure 3.1**).

5. Press **Enter** or **Esc** to exit the information screen and start using the program.

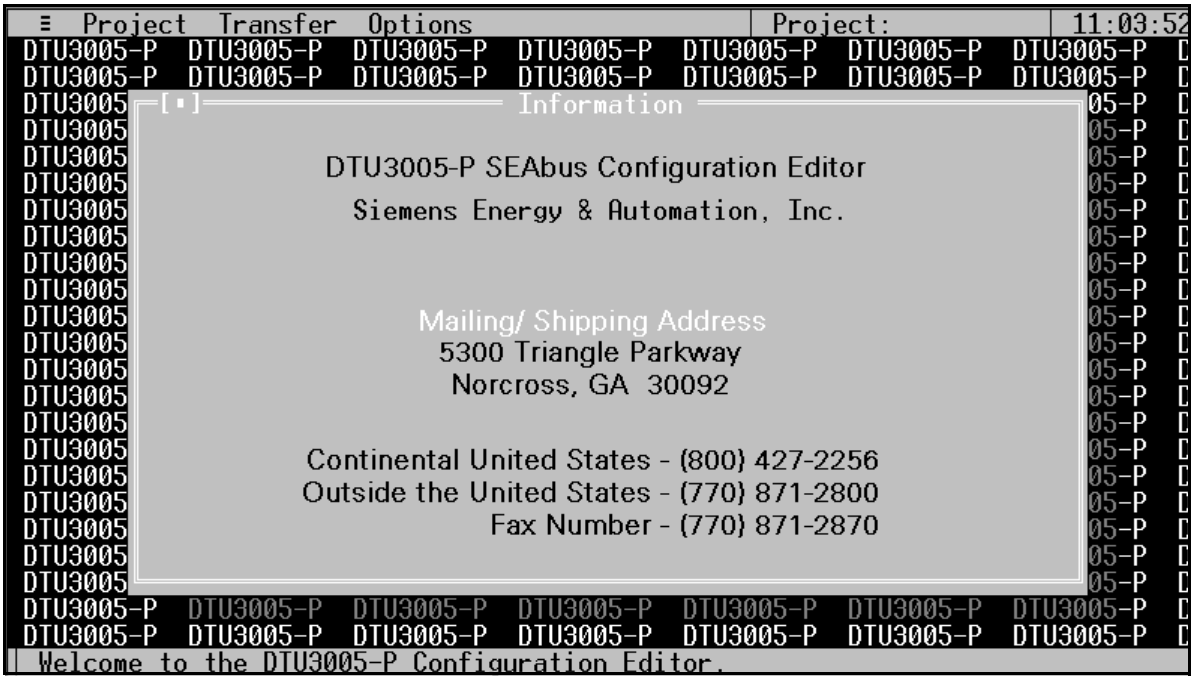

Figure 3.1 DTU3005P Editor Information Screen

3 Starting the Software

3.1 Menu Navigation

Navigation of the program menus and dialog boxes can be performed using either the keyboard or mouse. The program uses standard menus and dialog box user interfaces as many other DOS and Windows programs.

The mouse can be used to make menu selections, select items in a dialog box, and perform commands by clicking on dialog box buttons. Keyboard equivalents to mouse actions are described in **Table 3.1** below. Informational messages are displayed at the bottom of the screen to give you help with keyboard navigation

Note: To use a mouse in DOS mode, be sure the mouse driver is loaded before starting the program. This is usually done automatically from a command in the CONFIG.SYS or AUTOEXEC.BAT startup files from Windows 95. For information on how to load a mouse driver, refer to the instructions included with your mouse.

Table 3.1 Keyboard Navigation

Key	Description
Arrow keys	Moves the cursor in the direction of the arrow.
Enter	Performs the selected command.
Esc	Cancels a function, closes the menu or dialog box, and returns you to the previous menu or dialog box.
Tab	Moves between items in a dialog box.
Letter Keys	The colored letter in each menu item indicates which key performs that command.
Spacebar	Selects or deselects a selected check box.
Alt + Q	Closes the program.

3.2 Main Menu

The main menu is located on the top line of the screen. In addition to the menu selections, the name of the current project and the time of day is displayed. Following are the five main menu selections:

- ≡ — displays the program information screen.
- **Project** — enables you to load, save, view, and print project files. It also allows you to switch to a DOS prompt or quit the program. Its operation is described in **Figure 3.1**.
- **Edit** — available only when a project is open. It enables you to configure projects. See **Chapter 4** for instructions on configuring the DTU3005P for a Profibus DP network.
- **Transfer** — uploads and downloads project files to the DTU3005P unit. The procedures are described in **Chapter 5**.
- **Options** — changes the project file settings and indicates which COM and LPT ports to use. The procedures are described in **Chapter 6**.

3.3 Using the Project Menu

When you first start the DTU3005P Editor program, and no project file is loaded, the following selections are available on the **Project** menu (see **Figure 3.2**):

- **Open** — opens any saved project file.
- **New** — creates a new project file.
- **DOS Shell** — switches to DOS mode without closing the DTU3005P Editor program. To return to the program, type **exit** and then press **Enter** at the DOS prompt.
- **Quit** — closes the DTU3005P Editor program.

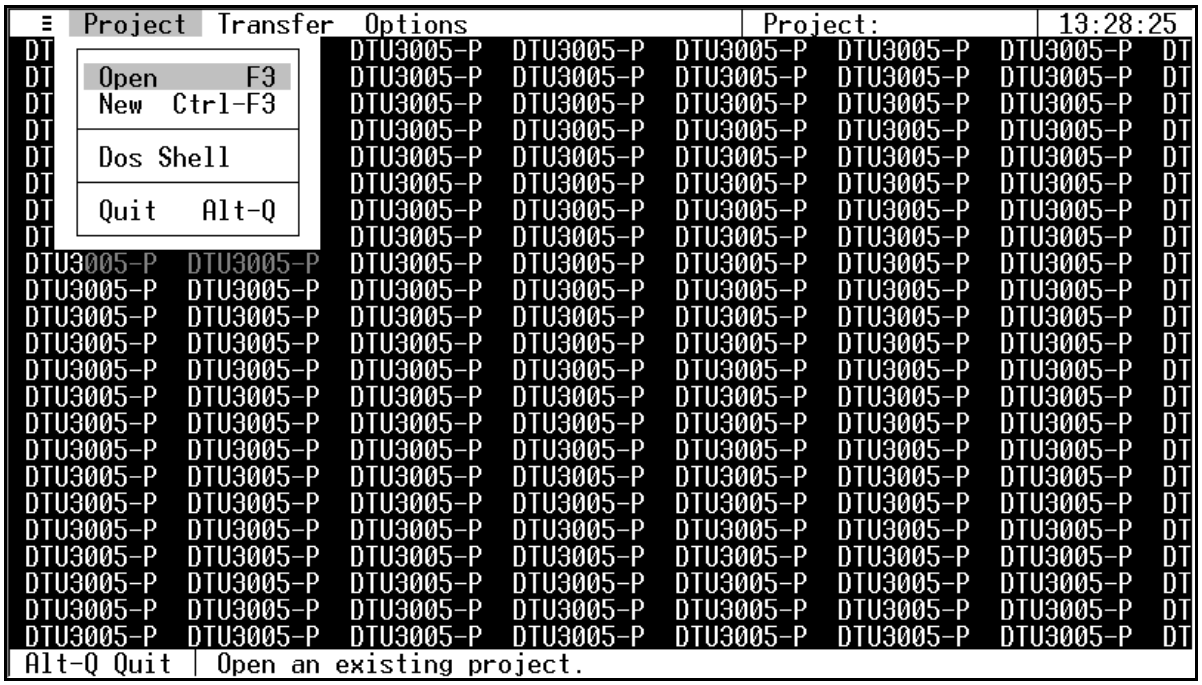

Figure 3.2 Project Menu

3.4 Starting a New Project

Projects contain the configuration information to be downloaded to the DTU3005P device. To create a new project, use the following steps:

1. Select the **Project** menu with the mouse or use the arrow keys to select **Project**, and then press **Enter**. The **Project** menu is displayed (see **Figure 3.2**).

Note: All menus and dialog box selections are accessible from the keyboard or by using the mouse. From this point on, this manual will only use the term select when referring to program navigation. Refer to **Figure 3.1** for menu navigation instructions.

2. From the Project menu, select **New**. The **New Project** screen is displayed (see **Figure 3.3**).

Tip: A keyboard shortcut for opening the New Project Screen is **Ctrl + F3**.

3. In the **Project Name** field, type a project name. A project name can contain up to eight letters and numbers.

4. Select **OK** to close the **New Project** screen. The Project menu is displayed.

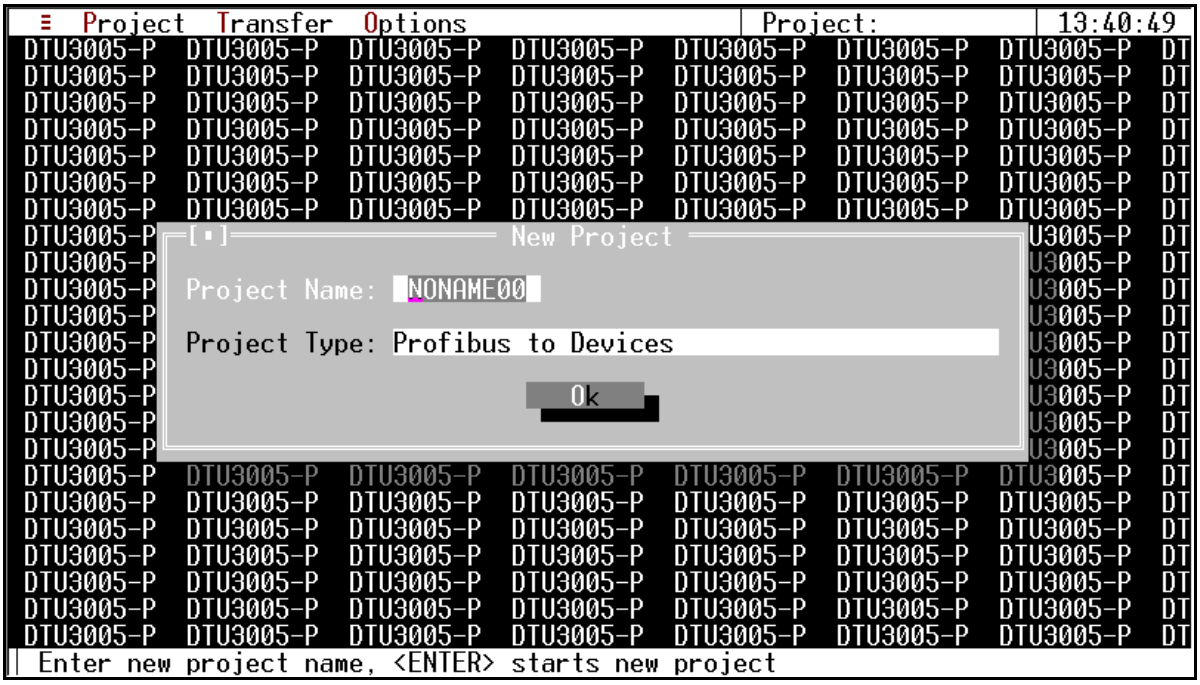

Figure 3.3 New Project Screen

When you select the **Project** menu again (see **Figure 3.4**), the following sub-headings are added:

- **Close** — closes the open project file. Multiple project files can be open at the same time.
- **View** — views the project file name, type, and the current selections for each of the DTU-3005's ports.
- **Save** — saves the current project file.
- **Save As** — allows to save the open project file under a different file name.
- **Switch To** — switches between the opened project files. Multiple project files can be open at the same time.
- **Print** — prints the project file's configuration information.

5. Select **Save**, or use the keyboard shortcut **F10** to save your new project. The Information screen is displayed, confirming that the new project is saved.

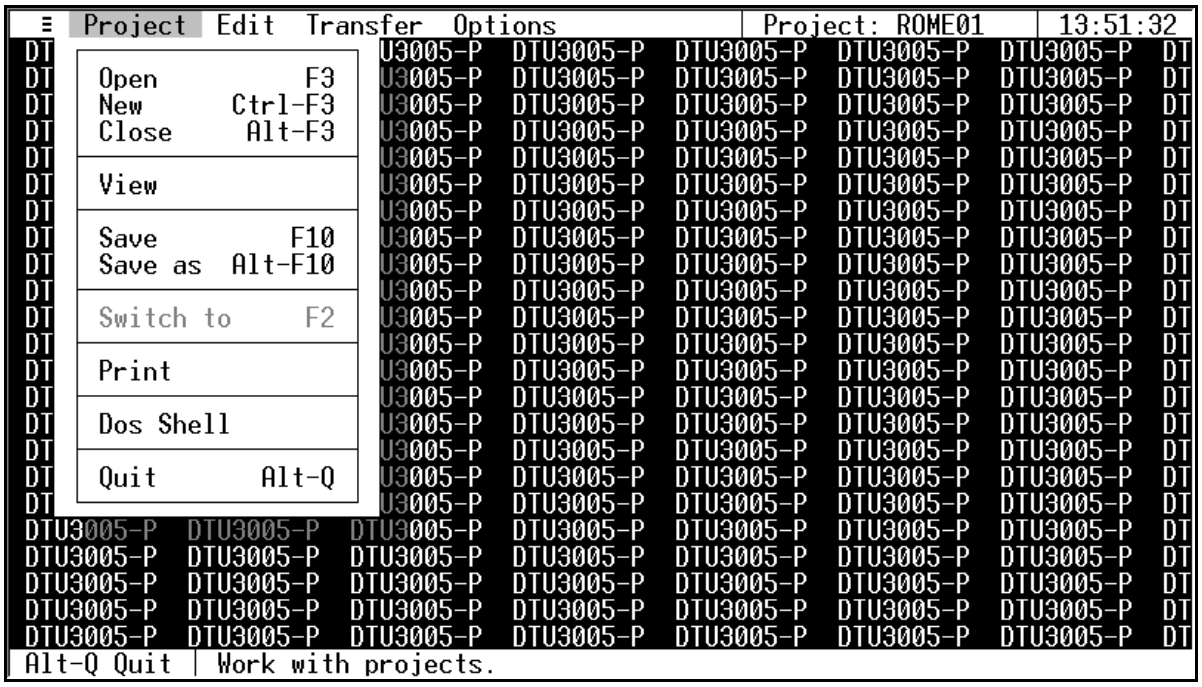

Figure 3.4 Project Menu with Additional Sub-Headings

3 Starting the Software

4 Creating Project Files — Profibus to Devices

This chapter covers how to configure the DTU3005P for Profibus communications with Siemens devices. Once you have created a project (see **Chapter 3**), follow the directions in this chapter to configure the project file. When you have finished, see **Chapter 5** for directions on downloading the project to the DTU3005P.

4.1 Configuring the Project File

After you have created or opened the project file, select **Edit** from the main menu and the following menu items are displayed (see **Figure 4.1**):

- **Port 1 (Profibus)**—configures the communications settings for the Port 1 connection to the Profibus network.
- **Port 2 (Devices)**—configures communications settings for SEAbus devices or Siemens protective relays connected to Port 2.
- **Port 3 (Passthrough)**—configures Port 3 as a passthrough to the devices on Port 2.
- **Device Defaults**—sets the default data registers for each device type, e.g., set the defaults for all 4720 power meters or all S7-I/O units. The data registers can still be customized for each device, as required (see **Section 4.5**).
- **Device List**—configures list of SEAbus devices or Siemens Protective relays connected to Port 2.

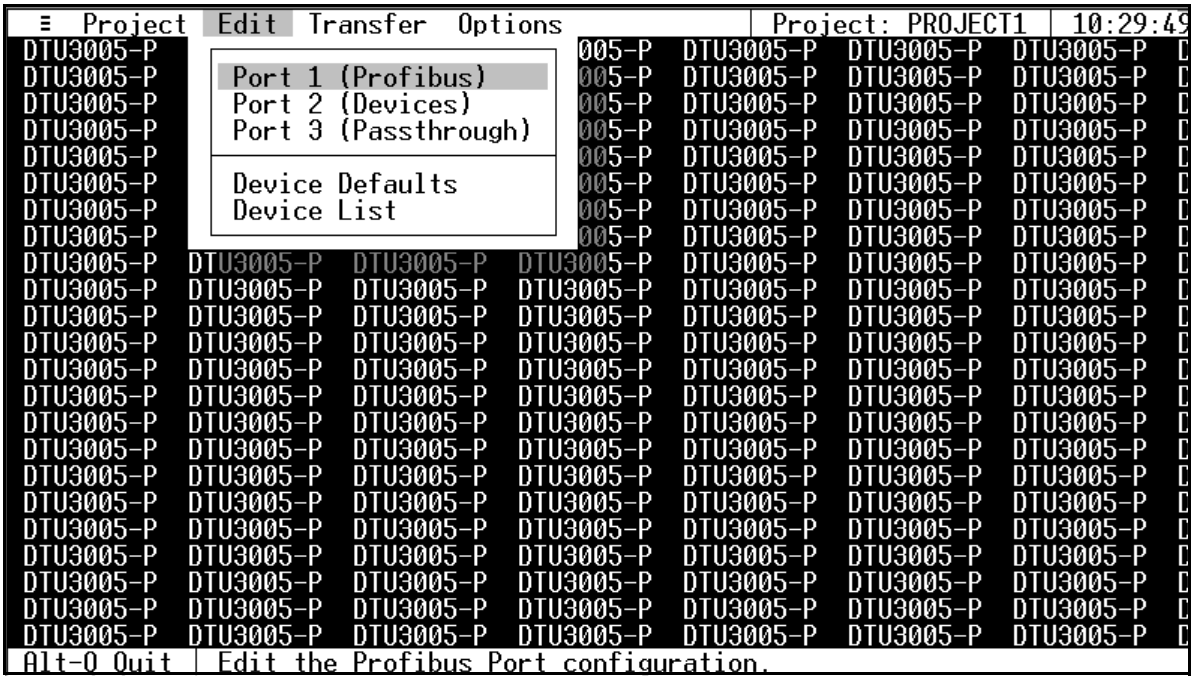

Figure 4.1 Contents of the Edit Menu

4.2 Profibus Setup—Port 1

Select **Port 1 (Profibus)** from the **Edit** menu. The Port 1 Profibus configuration screen is displayed (see **Figure 4.2**).

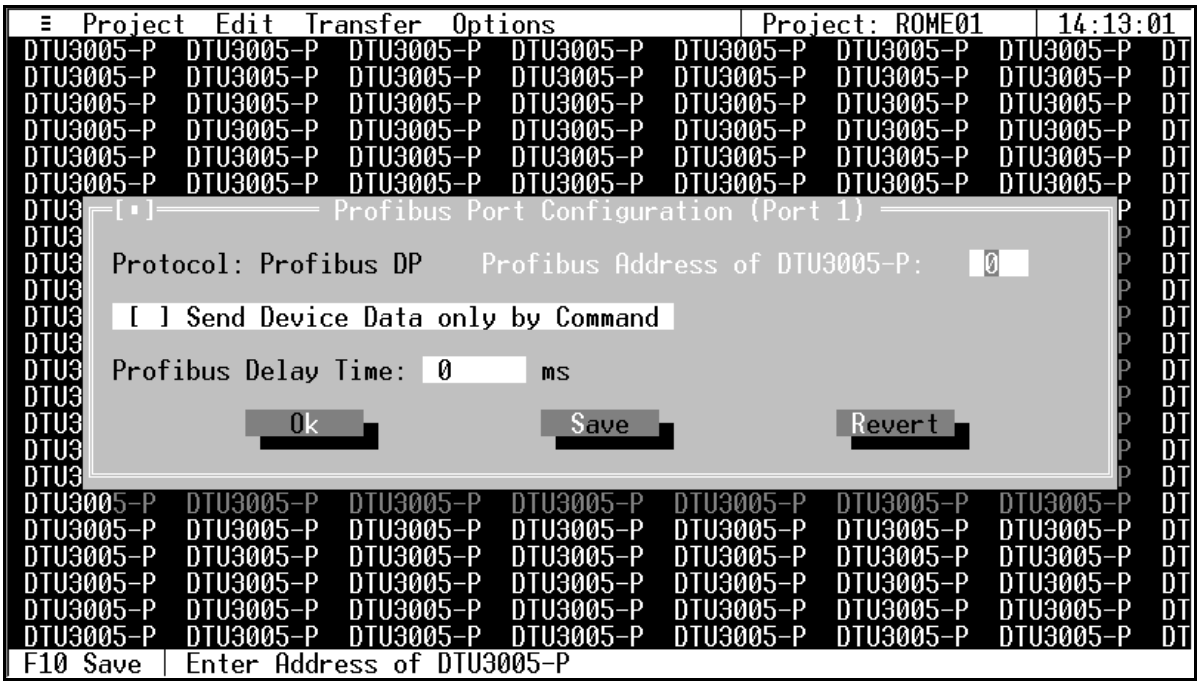

Figure 4.2 Profibus Port 1 Configuration Screen

Profibus Address of DTU3005P

Enter the Profibus device address for the DTU3005P. This address identifies the DTU3005P uniquely in the Profibus network. The acceptable address range is 1 to 254.

Send Device Data Only by Command

If the Send Device Data Only by Command check box is not selected, the Profibus Delay Time option applies. In this mode, the DTU3005P presents the device information to the Profibus-DP master going through the list of connected devices. The DTU3005P switches to the next device based on the delay time specified.

If the check box is selected, the data presented to the Profibus-DP master is based on the request (command) that the master is sending. The Profibus Delay Time option does not apply in this mode.

Profibus Delay Time

The Profibus Delay Time is the amount of time that the DTU3005P presents each device's data through the list of connected devices.

Communicating Wiring Port 1

The communication port on the DTU3005P is RS-485 compatible on a nine-pin subminiature D connector in accordance with the Profibus standard. The following diagram shows the connector that provides the physical connection for the communiation port (see **Figure 4.3**).

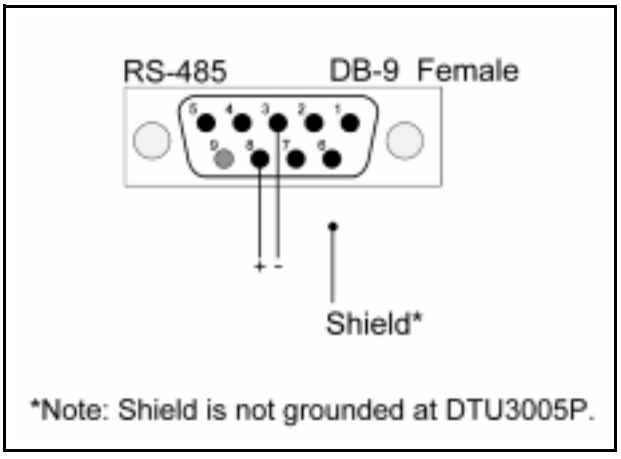

Figure 4.3 DB-9 / RS-485 Connector (two-wire)

4.3 Device Setup—Port 2

One or more Siemens devices may be connected to Port 2. To configure Port 2, select **Port 2 (Devices)** from the **Edit** menu. The configuration screen is displayed (see **Figure 4.4**).

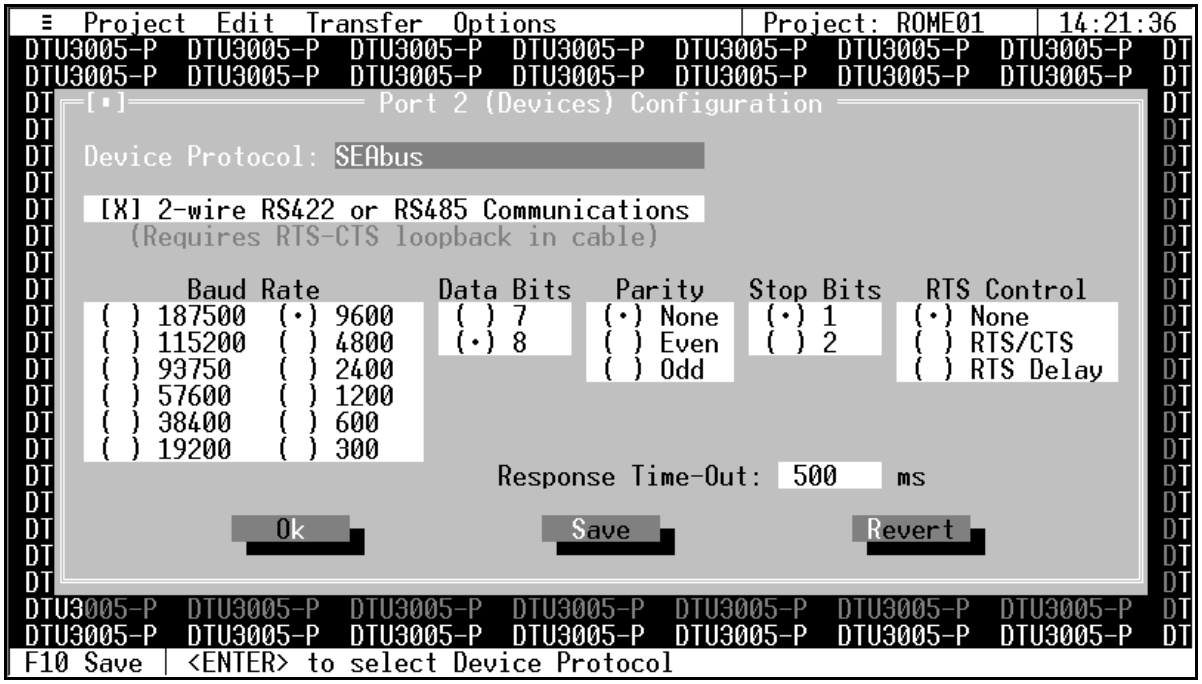

Figure 4.4 Port 2 Devices Configuration Screen

Device Protocol

The first field, **Device Protocol**, determines which Siemens devices can be connected to Port 2. There are the following two choices in the list box:

- **SEAbus** —for connection to Siemens ACCESS communicating trip units, relays, power meters and other devices.
- **VDEW**—for connection to Siemens protective relays using the VDEW protocol

Not all Siemens devices are supported. For a list of supported devices, see **Appendix A**.

2 Wire RS422 or RS485 Communications

Check this box if the communications wiring with your devices is a 2-wire RS485 or RS422 interface (see **Figure 4.5**). When 2-wire communications are used, RTS must be looped back to CTS on the DTU side of the cable. This can be done on the RS232 side by looping pins 4 and 5 or on the RS422/485 side by looping pins 16 to 18 and 17 to 19. RS-485 is the standard communications interface used by ACCESS devices.

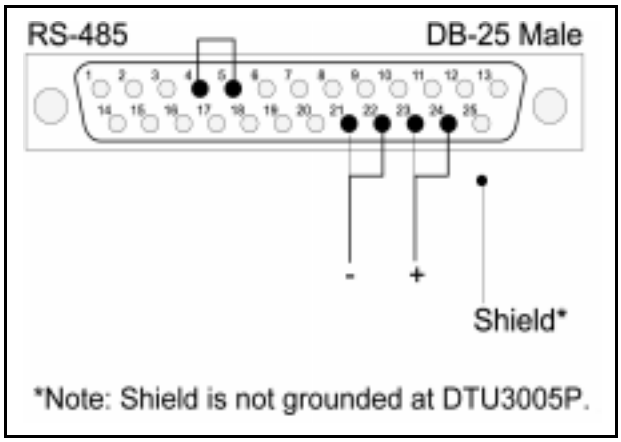

Figure 4.5 DB-25 / RS-485 Connector (two-wire)

Communications Settings

These settings set up the Baud rate and other communications parameters used by the devices.

Note: To move between the communications settings, press the **Tab** or **Enter** keys. To select a setting, use the **Up** or **Down Arrow** key to move to the desired setting and press the **Space Bar** to change your selection.

RTS Control (Request to Send Control)

RTS Control selection is an option for modems that require RTS to be active only while the DTU is transmitting to the devices. If the **RTS/CTS** check box is selected, the DTU will activate RTS and wait until CTS is active before transmitting. If the **RTS Delay** check box is selected, the DTU will activate RTS and wait for the specified delay time to pass before transmitting. When **RTS Delay** is selected, the program displays an entry box for the RTS delay time. In the RTS Delay field, enter the delay time in milliseconds.

Response Time-Out

The Response Time-Out tells the DTU how long to wait for a response after transmitting a request to the devices. If no response has been received from the devices after the specified amount of time passes, the DTU will assume that no response is coming and will retry the request. Enter the time in the Response Time-Out field in milliseconds.

After you have entered all of the configuration information, select **Save**. The Information screen displays a confirmation message indicating that the configuration is saved. Select **Ok** to close the Information screen. Select **Revert** to return to the previously saved configuration.

Note: If you have changed the configuration and have not saved it to the project file, you will be prompted to either save or discard your changes.

When VDEW is selected as the device protocol, the Edit menu changes to reflect the different configuration options it uses (see **Figure 4.6**).

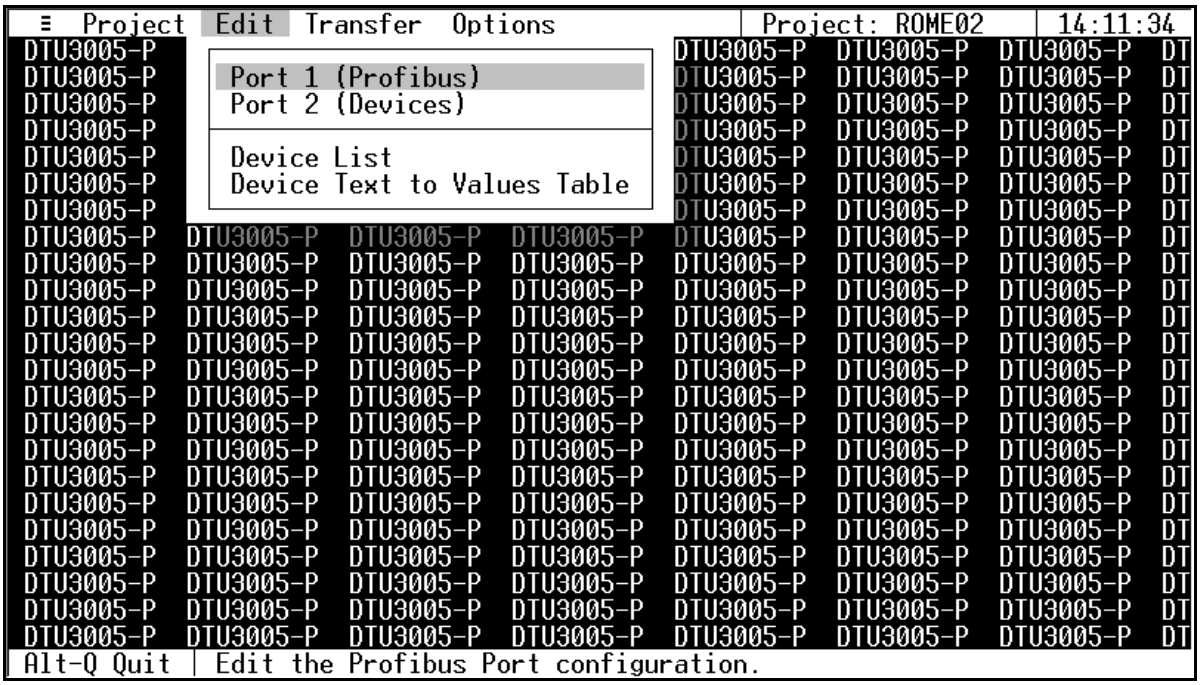

Figure 4.6 Edit Menu with Configuration Options for the VDEW Protocol Option

4.4 Passthrough Setup—Port 3

Port 3 can be used for passthrough communications to your Siemens SEAbus devices and protective relays.

A PC running WinPM, or other supervisory software, connected to Port 3 of the DTU3005P can communicate to the Siemens devices connected to Port 2. Any messages received on Port 3 of the DTU are "passed through" to the devices.

To configure Port 3, select **Port 3 (Passthrough)** from the **Edit** menu. The configuration screen is displayed (see **Figure 4.7**).

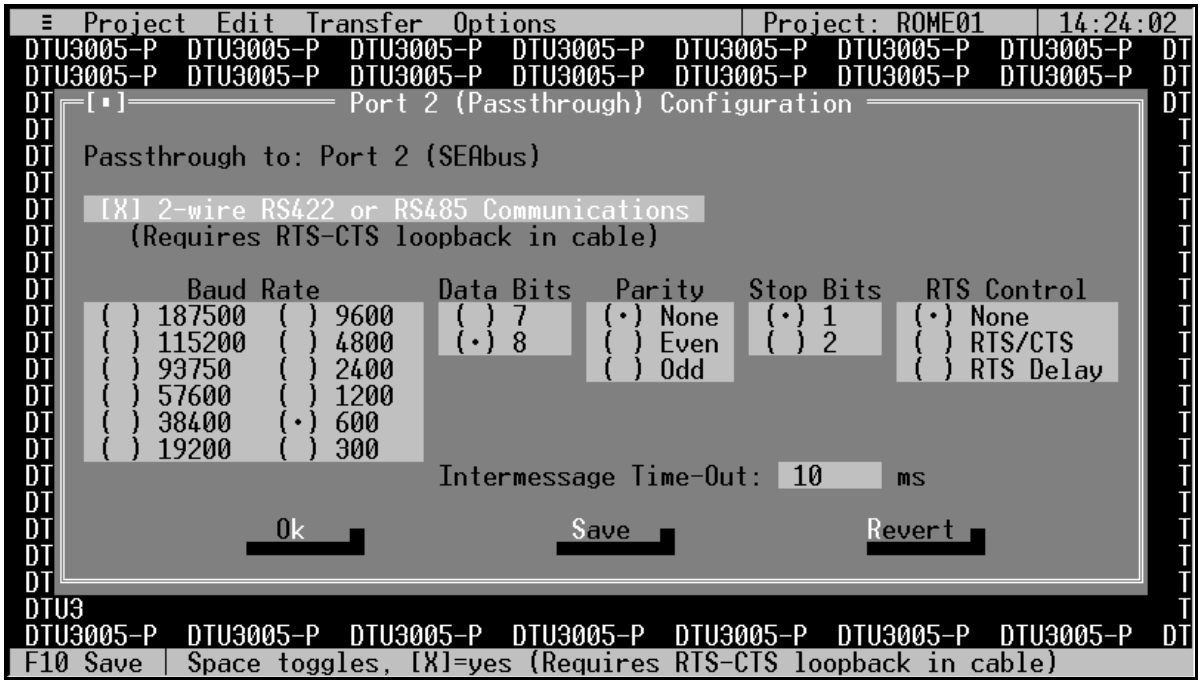

Figure 4.7 Port 3 (Passthrough) Configuration Screen

2 Wire RS422 or RS485 Communications

Check this box only if the communications with your SEAbus devices use a 2-wire RS485 or RS422 interface (see **Figure 4.5**). This is the usual method of connecting SEAbus devices. When 2-wire communications are being used, RTS must be looped back to CTS on the DTU side of the cable. This can be done on the RS232 side by looping pins 4 and 5 or on the RS422/485 side by looping pins 16 to 18 and 17 to 19.

The remaining configuration selections, except for intermessage time-out, are the same as those for Port 1. Refer to **Section 4.3** for instructions on these fields.

Intermessage Time-Out

The DTU3005P uses the intermessage time-out option to provide slave devices enough time to respond. When a SEAbus message is received in Port 3, a timer starts and keeps timing until the SEAbus device responds or the timer expires. While the timer is active, Port 3 does not process any additional messages transmitting to Port 3.

Note: To change the intermessage time-out amount, select the **Intermessage Time-Out** field and enter the value in milliseconds.

After you have entered all of the configuration information, select **Save**. The Information screen displays a confirmation message indicating that the configuration is saved (see **Figure 4.8**). Select **Ok** to close the Information screen. Select **Revert** to return to the previously saved configuration.

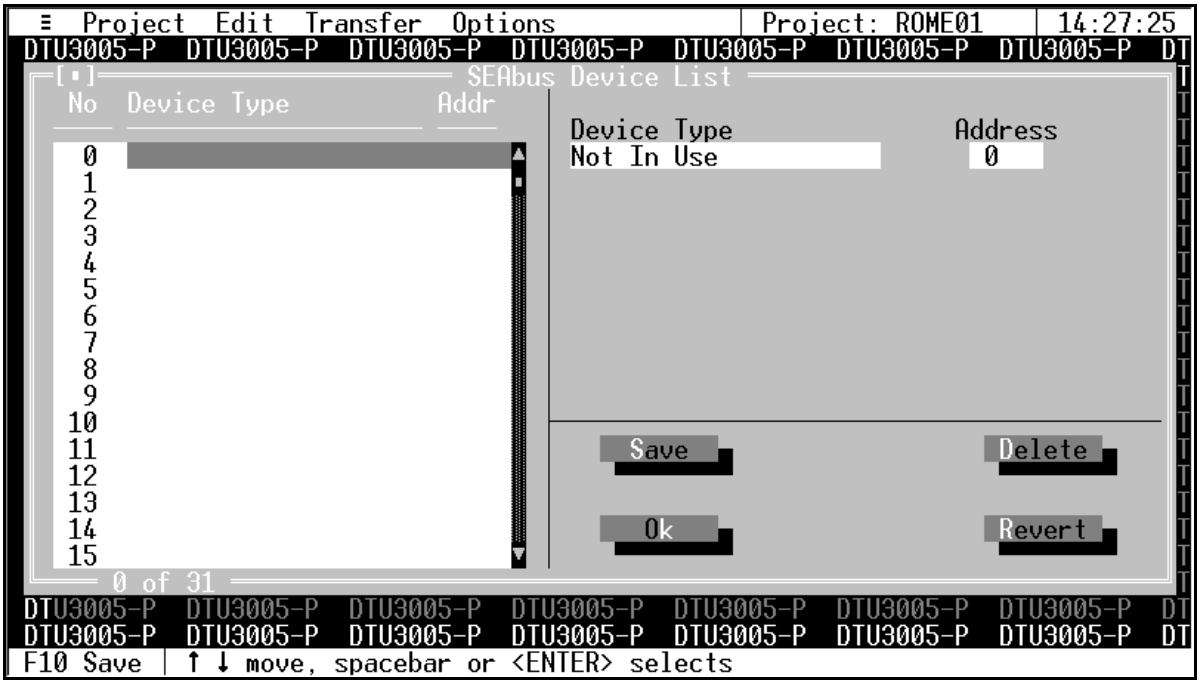

Figure 4.8 SEAbus Device List Menu

4.5 Device Defaults

If you are configuring custom device registers for more than one device of a certain type, you may configure the default custom registers from the Edit Menu **Device Defaults** command (see **Figure 4.6**). After configuring the default device registers, you may use them for any or all devices, or further customize individual registers for any of your devices. SEAbus devices can have 16 custom registers. VDEW devices may have between 1 and 64 custom registers.

Configuring Default Custom Device Registers by Device Type

1. Select **Device Defaults** from the **Edit** menu. A list of devices is displayed (See **Figure 4.9**). If you have configured Port 2 for SEAbus devices, only SEAbus devices are displayed on the menu. Likewise, if you have configured Port 2 for VDEW devices, only VDEW devices are displayed on the menu.

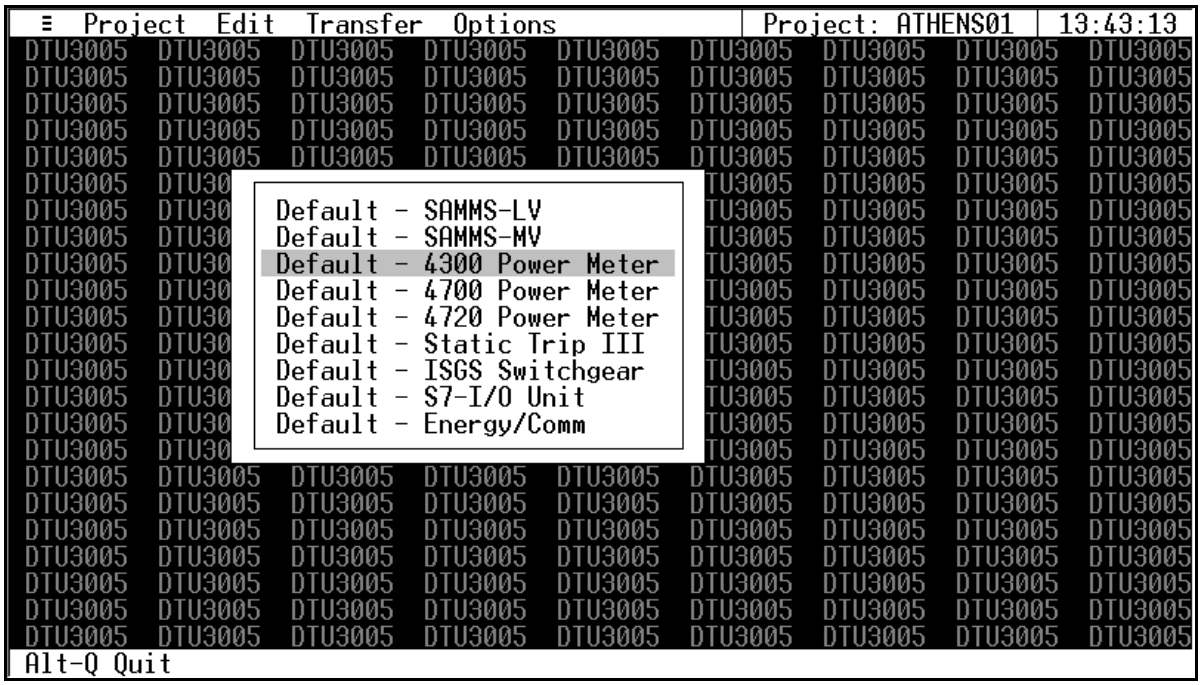

Figure 4.9 Device Defaults Menu

2. Select the device you want to configure. The default custom register configuration menu is displayed (see **Figure 4.10**). The first time you select this command, the first 16 registers (64 for VDEW devices) from the device's standard data register list display on the default real-time data list. Not all of the entries are visible on the menu. Use the scroll bar or the **Page Up** and **Page Down** keys to view all the entries.

Figure 4.10 Default Custom Data Item Dialog

3. Select a data item and press **Enter** to see a list of device real time data that can be assigned to that data word (see **Figure 4.11**). Select **Not Used** if you do not want that data word to be used. Not all of the entries are visible on the menu. Use the scroll bar or the **Page Up** and **Page Down** keys to view all of the entries. Select **Clear All** to set all data words to "Not Used." Select **Set to Base** to create a new base default for 16 registers for SEAbus devices (64 for VDEW devices) from the device's standard data register list.

4. Select **Save** to save your configuration or **Revert** to restore the last previously saved configuration for that device. When you are finished configuring the default data registers for that device, select **Ok** to close this screen.

To conserve registers when using VDEW devices, you should set all unused registers to "Not Used" and place them at the end of the list. The DTU3005P will then allocate registers for those containing device data. (This allocation does not apply to SEAbus devices, for which the DTU3005P allocates 16 registers regardless if they are used or not.)

Figure 4.11 Default Custom Data Item Selection

4.6 Device List Setup

The device list menu item indicates which devices the DTU3005P is going to communicate with and will be shared to the Profibus-DP network. In this menu, you will enter the device type and address for each Siemens device connected to Port 2. You will also have the option to select which registers will be shared to the Profibus-DP network.

To display the device list setup menu, select **Device List** from the **Edit** menu. The device list menu is displayed (see **Figure 4.12)**.

On the left side of the menu box is a list of the devices connected to Port 2. Up to 32 SEAbus or 16 VDEW devices can be attached. The list is initially empty, and you can add, change, and delete devices by using the entry fields and buttons on the right side of the menu box.

Note: Only 16 of the 32 devices are visible on the screen. To see all the devices, click on the scroll bar with the mouse, or use the **Up** and **Down Arrow** and **Page Up** and **Page Down** keys.

Figure 4.12 SEAbus Device List Menu

To add a device to the device list, complete the following steps:

1. Select the device number from the left side of the menu. The Device Type and Address fields should be blank. You should select the lowest numbered blank device field.

2. Select the **Device Type** field on the right side and press **Enter**. The **Device Types** list is displayed (see **Figure 4.13**).

Figure 4.13 SEAbus Device Types List

3. Select the device you want from the list. The **Address** field is selected and the Profibus data register fields are displayed (see **Figure 4.14**).

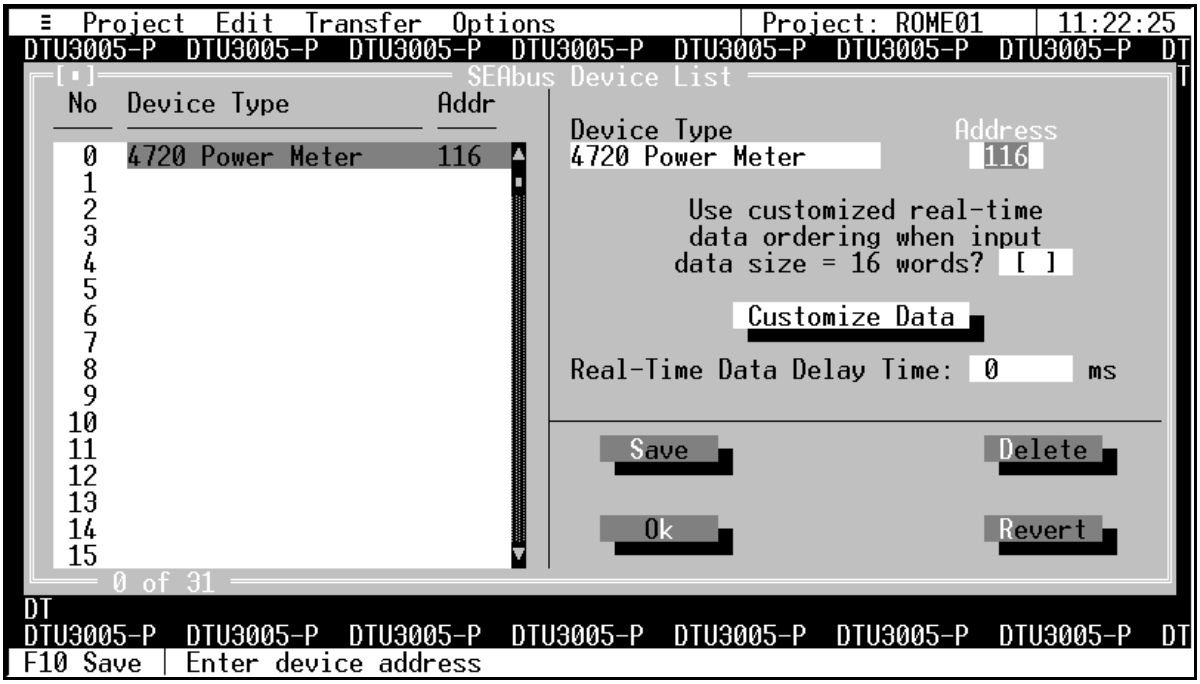

Figure 4.14 SEAbus Device List with Real-Time Data Ordering Option

4. With the **Address** field selected, enter the device's address. This number should be between 1 and 254, and should match the number programmed into the device itself.

5. Select the **Use customized real-time data ordering when input data size = 16 words?** check box to customize the order of data items collected by the DTU3005P.

6. In the **Real-Time Data Delay Time** field, enter the number of milliseconds you want to to slow down communication with any of the 32 devices selected in the device list.

7. If you selected the customized data ordering, check box, the Customize Data button becomes active. Select the **Customize Data** button and the Customized Real-Time Data dialog is displayed (see **Figure 4.15**).

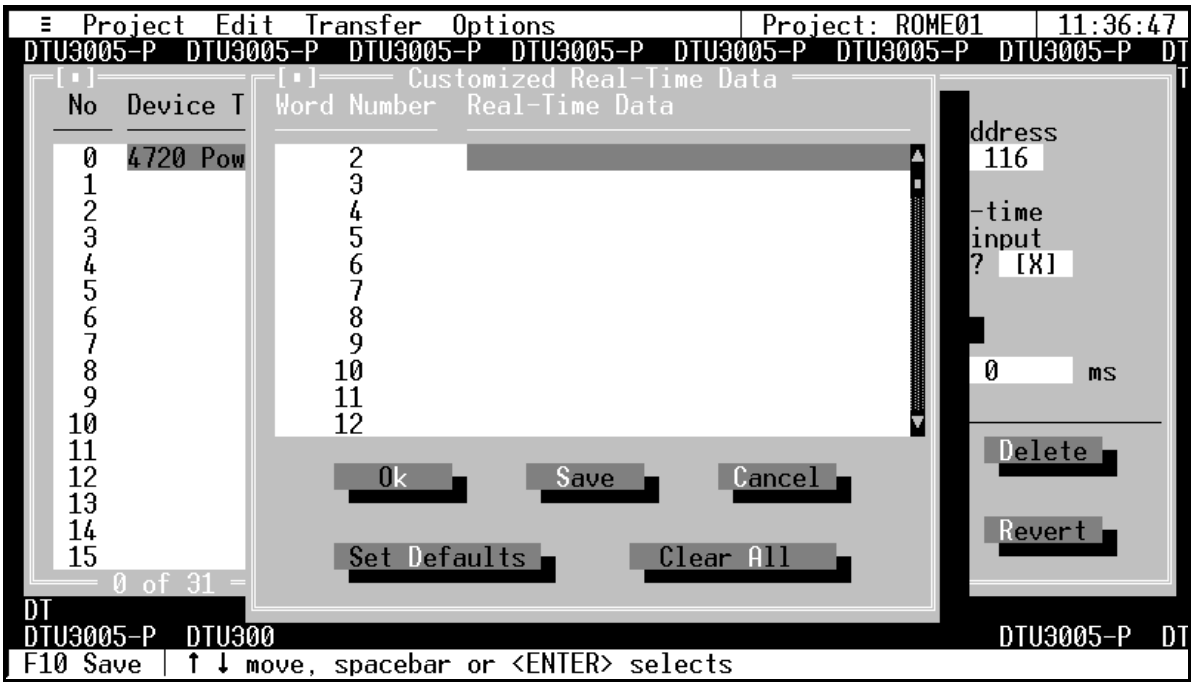

Figure 4.15 Customized Real-Time Data Dialog Box

8. Select a Word Number from 2 to 15. A menu of choices is displayed (see **Figure 4.16**).

Note: Selecting a word number allows you to select which real-time data item will be written to that particular word. **Appendix C** lists the available data items for each device.

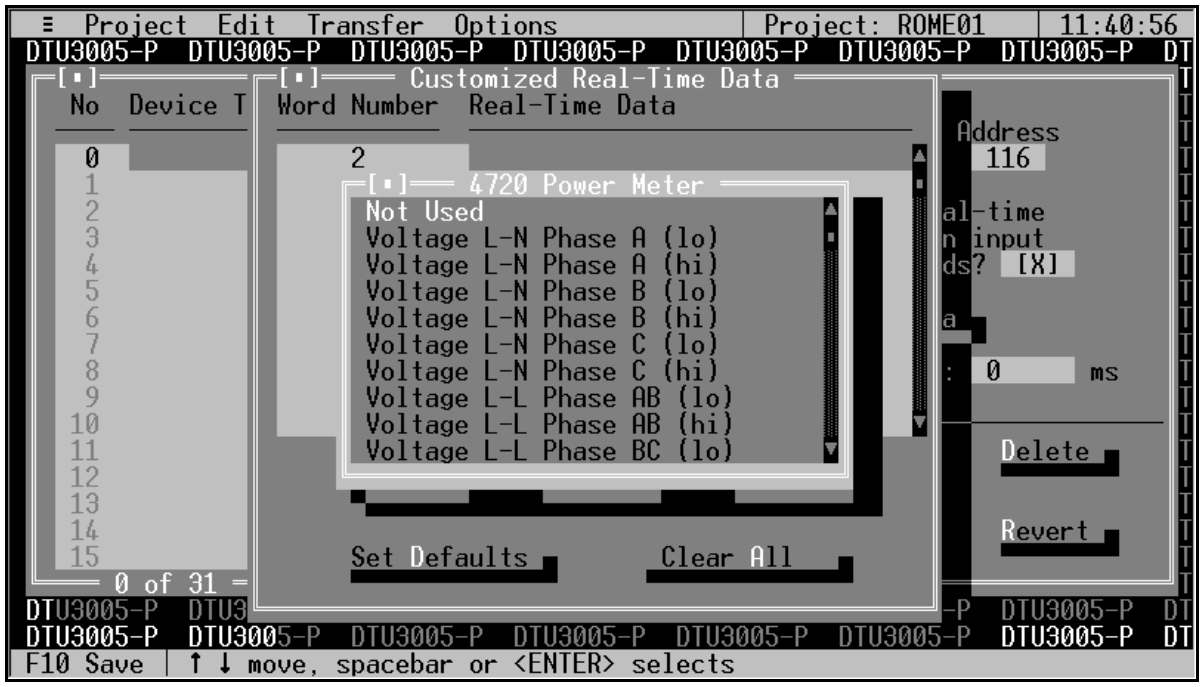

Figure 4.16 Customized Real-Time Data Menu

9. Select a data item from the list. Not all available items are shown at one time. To view all the choices, use the **Up** and **Down Arrow** keys, the **Page Up** and **Page Down** keys, or use the mouse to click the arrows on the scroll bar on the right side of the list. Press **Enter** to make the selection.

10. Repeat steps 7 and 8 for each Word Number you want to configure. You may return to the default data items by selecting the **Set Defaults** button. You can change any word number you want to be different from the default. Or, you may clear the entire list by selecting the **Clear All** button.

11. When you are finished configuring all of the word numbers, select **Save** to save your choices, and then select **OK**. If you wish to cancel all of the changes you have made, select **Cancel**.

To remove a device from the device list, select **Delete**. Selecting **Pack** will minimize the size of the command register block, removing registers for deleted devices.

Once you have entered the device information for all the devices attached to Port 2, Select **Save** to save the device information to the project file, and then select **OK** or press **Esc** to exit the device list configuration screen.

If at any time you want to return to the last saved version of the device list, select **Revert**.

4.7 Device Text Setup (7SJ600 Only)

The Device Text to Values Table menu item is only available for configuring the 7SJ600 relay. It is used to convert status codes returned from select parameters in the 7SJ600 relay to values in a format useful to the system connected to Port 2 of the DTU3005P. The conversion affects the status readouts from the device's binary inputs, signal and trip rated contacts, and the LEDs.

To edit this table, select **Device Text to Values Table** from the **Edit** menu (see **Figure 4.17**). This selection is only available when the device protocol for Port 2 is set for "VDEW."

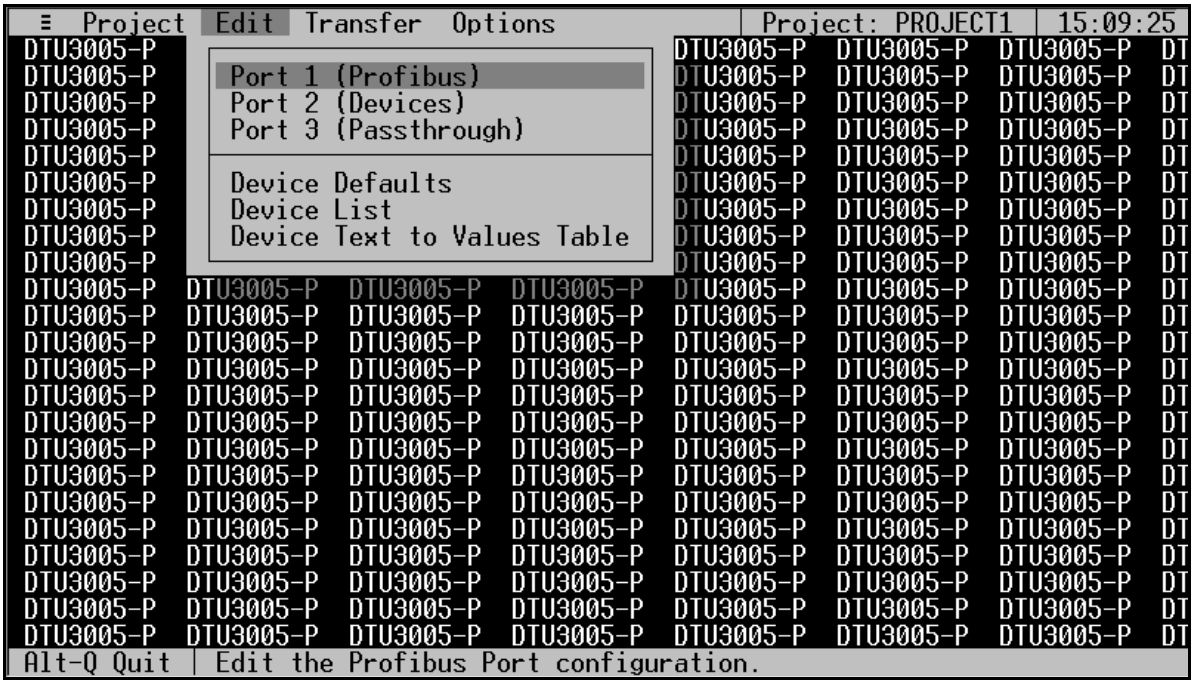

Figure 4.17 Edit Menu with VDEW Options

Once open, 64 conversions can be defined (see **Figure 4.18**). To define a conversion, enter the 7SJ600 relay status code in the **Text #** column and enter the corresponding output value desired in the **Value** column.

Note: For more information on Text Numbers/ Status Codes see **Table 4.1**

Once you are finished entering data, select **Save** to save your configuration, then select **Ok** to exit the dialog box. Select **Revert** to bring back the previous settings.

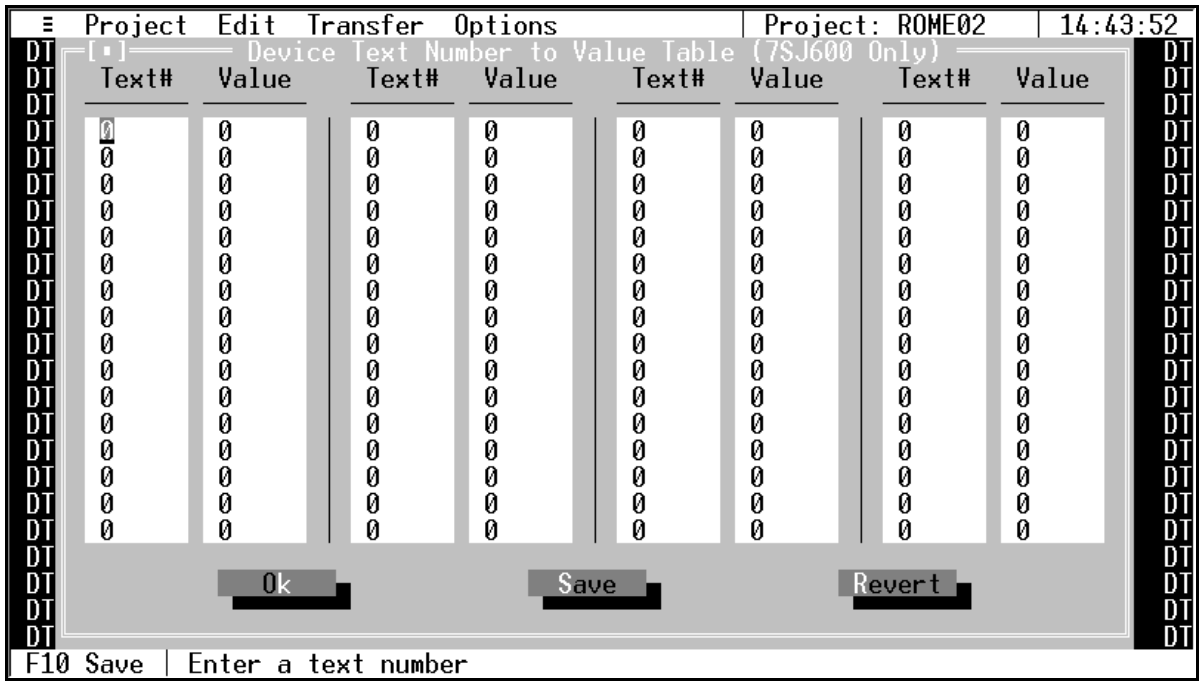

Figure 4.18 Device Text Number to Value Table (7SJ600 Only)

The relevant status codes (Text #) are listed below.

Table 4.1 7SJ600 Relay Information

For Requesting Status of the 7SJ600 Relay's Three Binary Inputs							
Text Number/Status Code (default value returned if not converted)	**Description of Returned Binary Input Status Codes: I1 indicates Input 1; I2,3 indicates Inputs 2 and 3**	**Suggested Value (Using This Conversion Table)**					
		Value	**Inputs**	**I3**	**I2**	**I1**	
		0	0	0	0	0	
1342	I1,2 Inactive: I3 Active	4	0	1	0	0	
1343	I1,3 Inactive: I2 Active	2	0	0	1	0	
1344	I1 Inactive: I2,3 Active	6	0	1	1	0	
1345	I2,3 Inactive: I1 Active	1	0	0	0	1	
1346	I2 Inactive: I1,3 Active	5	0	1	0	1	
1347	I3 Inactive: I1,2 Active	3	0	0	1	1	
1348	I1,2,3 Active	7	0	1	1	1	
For Requesting Status of the 7SJ600 Relay's Two Trip Contacts and Two Signal Contacts							
Text Number/Status Code (default value returned if not converted)	**Description of Returned Trip and Signal Relay Status Codes: S1,2 indicates Signal Relays 1 and 2; T1,2 indicates Trip Relays 1 and 2**	**Suggested Value (Using This Conversion Table)**					
		Value	**Outputs**	**S2**	**S1**	**T2**	**T1**
			Bits 15. . . 4	**3**	**2**	**1**	**0**
1349	S1,2 T1,2 Open	0	0	0	0	0	0
1350	S1,2 T1 Open : T2 Closed	2	0	0	0	1	0
1351	S1,2 T2 open : T1 Closed	1	0	0	0	0	1
1352	S1,2 Open : T1,2 Closed	3	0	0	0	1	1
1353	S1 T1,2 Open : S2 Closed	8	0	1	0	0	0
1354	S1 T1 Open : S2 T2 Closed	10	0	1	0	1	0
1355	S1 T2 Open : S2 T1 Closed	9	0	1	0	0	1
1356	S1 Open : S2 T1,2 Closed	11	0	1	0	1	1
1357	S2 T1,2 Open : S1 Closed	4	0	0	1	0	0
1358	S2 T1 Open : S1 T2 Closed	6	0	0	1	1	0
1359	S2 T2 Open : S1 T1 Closed	5	0	0	1	0	1
1360	S2 Open : S1 T1,2 Closed	7	0	0	1	1	1
1361	T1,2 Open : S1,2 Closed	12	0	1	1	0	0
1362	T1 Open : S1,2 T2 Closed	14	0	1	1	1	0
1363	T2 Open : S1,2 T1 Closed	13	0	1	1	0	1
1364	S1,2 T1,2 Closed	15	0	1	1	1	1
For Requesting Status of the 7SJ600 Relay's Four Programmable LEDs							
Text Number/Status Code (default value returned if not converted)	**Description of Returned LED Status Codes: L1,2 indicates LEDs 1 and 2**	**Suggested Value (Using This Conversion Table)**					
		Value	**Outputs**	**L4**	**L3**	**L2**	**L1**
			Bits 15 . . . 4	**3**	**2**	**1**	**0**
1365	L1,2,3,4 Off	0	0	0	0	0	0
1366	L4 On : L1,2,3 Off	8	0	1	0	0	0
1367	L3 On : L1,2,4 Off	4	0	0	1	0	0
1368	L3,4 On : L1,2 Off	12	0	1	1	0	0
1369	L2 On : L1,3,4 Off	2	0	0	0	1	0

Table 4.1 7SJ600 Relay Information **(Continued)**

For Requesting Status of the 7SJ600 Relay's Four Programmable LEDs						
Text Number/Status Code (default value returned if not converted)	**Description of Returned LED Status Codes: L1,2 indicates LEDs 1 and 2**	**Suggested Value (Using This Conversion Table)**				
		Value	**Outputs**	**L4**	**L3**	**L2**	**L1**
			Bits 15 . . . 4	**3**	**2**	**1**	**0**
1370	L2,4 On : L1,3 Off	10	0	1	0	1	0
1371	L2,3 On : L1,4 Off	6	0	0	1	1	0
1372	L2,3,4 On : L1 Off	14	0	1	1	1	0
1373	L1 On : L2,3,4 Off	1	0	0	0	0	1
1374	L1,4 On : L2,3 Off	9	0	1	0	0	1
1375	L1,3 On : L2,4 Off	5	0	0	1	0	1
1376	L1,3,4 On : L2 Off	13	0	1	1	0	1
1377	L1,2 On : L3,4 Off	3	0	0	0	1	1
1378	L1,2,4 On : L3 Off	11	0	1	0	1	1
1379	L1,2,3 On : L4 Off	7	0	0	1	1	1
1380	L1,2,3,4 On	15	0	1	1	1	1

5 Transferring Project Files

After you have configured and saved your project file for your particular application, you need to download it to the DTU3005P unit. Select **Transfer** from the main menu and the following selections are available (see **Figure 5.1**):

- **Download project to DTU3005P**—Transfers (downloads) any created project file from your PC to the DTU3005P.
- **Upload project from DTU3005P**—Transfers (uploads) the project file stored in the DTU3005P to the PC.
- **Verify**—Verifies a project file within your computer against the current project file stored in the DTU3005P unit.
- **Check Application in DTU3005P**—Checks what type of project file (PLC to devices, Modbus Master to devices, or Passthrough) and which protocols have been loaded for each of the communication ports. It also reports the revision level of the DTU3005P unit's firmware.

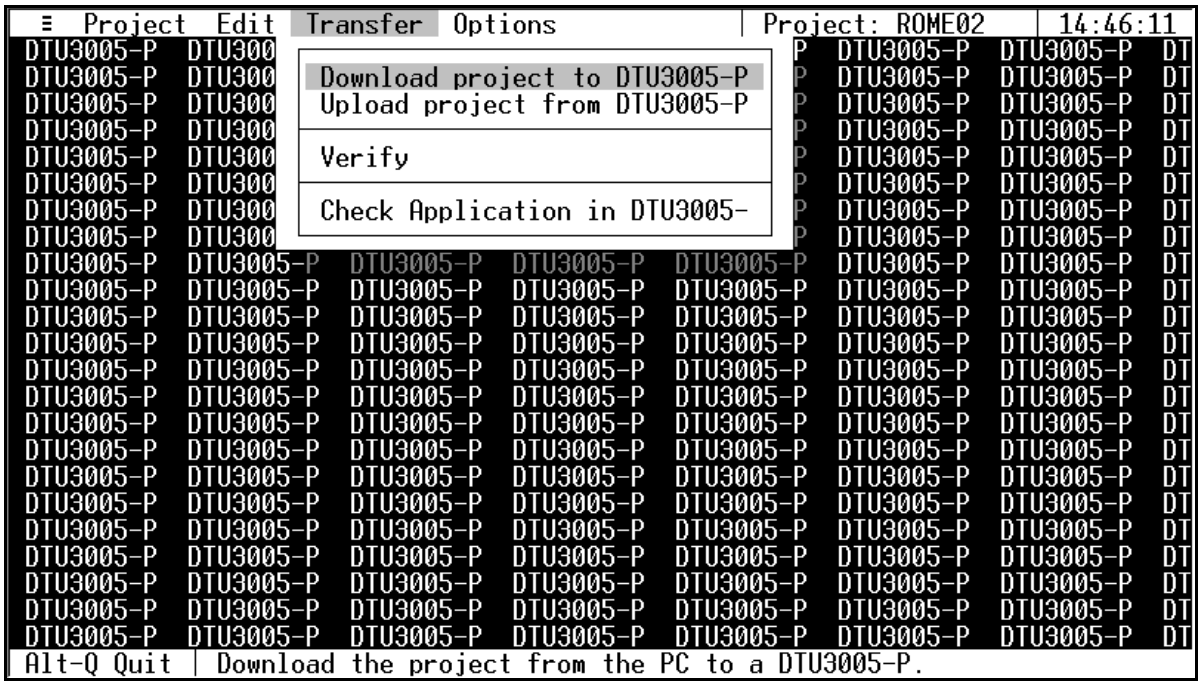

Figure 5.1 Contents of the Transfer Menu

Before using these commands, you must physically connect Port 3 of the DTU3005P to your computer using a null modem cable. Be sure that power is supplied to the DTU3005P.

For the null modem cable, pins 2 and 3 (RXD and TXD) must be crossed. On the computer end of the cable, pins 7 and 8 (RTS and CTS) should be connected together. Pins 1, 4, and 6 (DCD, DTR and DSR) should be connected together. The cable diagram is illustrated below in **Figure 5.2**.

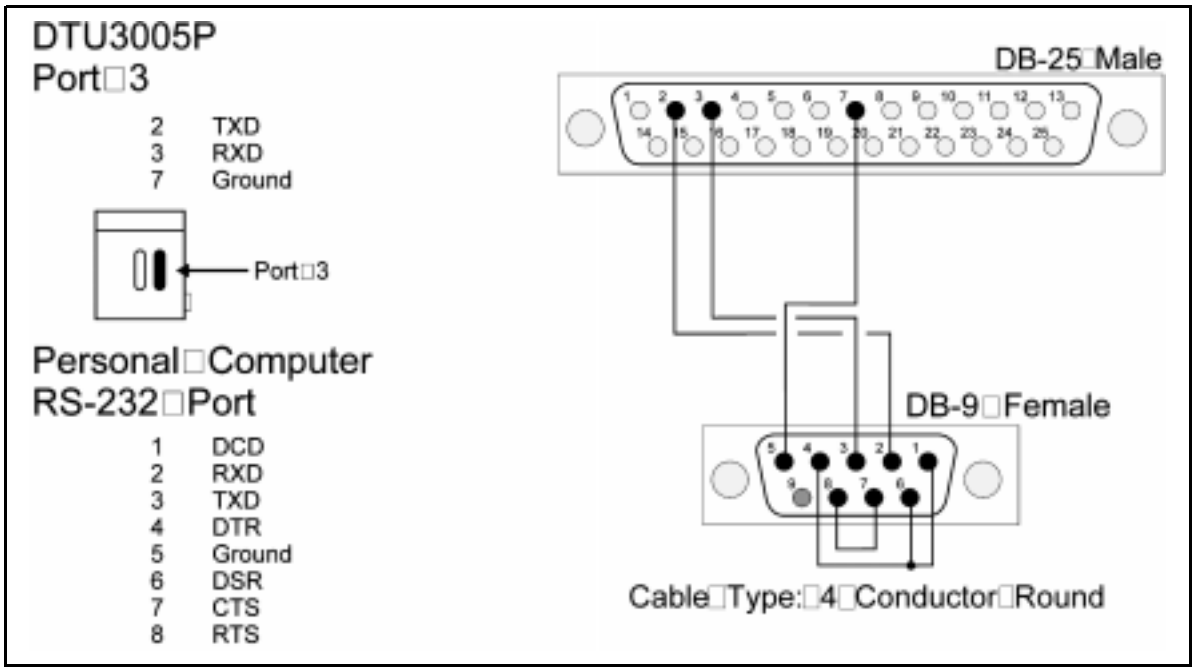

Figure 5.2 Null Modem Cable Connection

In addition, the DIP Switches on the front of the DTU3005P unit must be set to configuration mode. The DIP Switch settings are listed below in **Table 5.1**.

Table 5.1 Mode Switch Setting

Mode	Switch 1	Switch 2	Switch 3	Status LED
Normal Operation	Off	Off	**Off**	On steady
Configura-tion	Off	Off	**On**	Flashing Green

Note: After setting the DIP Switches, cycle the power off and on to reset the DTU3005P to configuration mode. To reset the DIP Switches to normal mode, cycle the power on and off again.

When configured correctly, the status LED on the front of the DTU3005P unit flashes green to indicate that the unit is in configuration mode (see **Figure 5.3**).

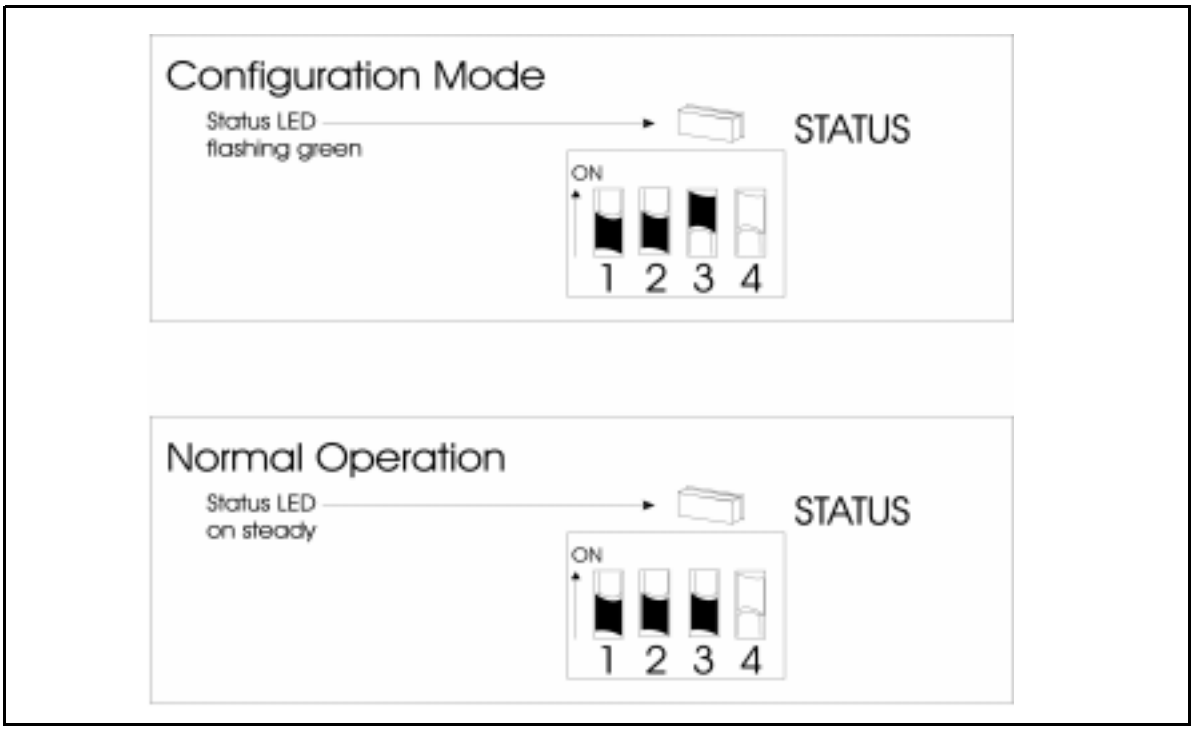

Figure 5.3 Dip Switch Settings for Normal Operation and Configuration Modes

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5.1 Downloading Projects

Select **Download project to DTU3005P** from the **Transfer** menu. The Transfer Confirmation screen is displayed (see **Figure 5.4**).

Select **Ok** and the DTU3005P Editor program transfers the open project to the DTU3005P unit.

5.2 Uploading Projects

Select **Upload project from DTU3005P** from the **Transfer** menu, and the confirmation screen shown below is displayed. Select **Ok** and the DTU3005P Editor program transfers the project from the DTU3005P unit to your computer.

The computer will upload the project file under the name "NONAME." You must save this uploaded project file using the **Save As** command from the **Project** menu and enter your own file name.

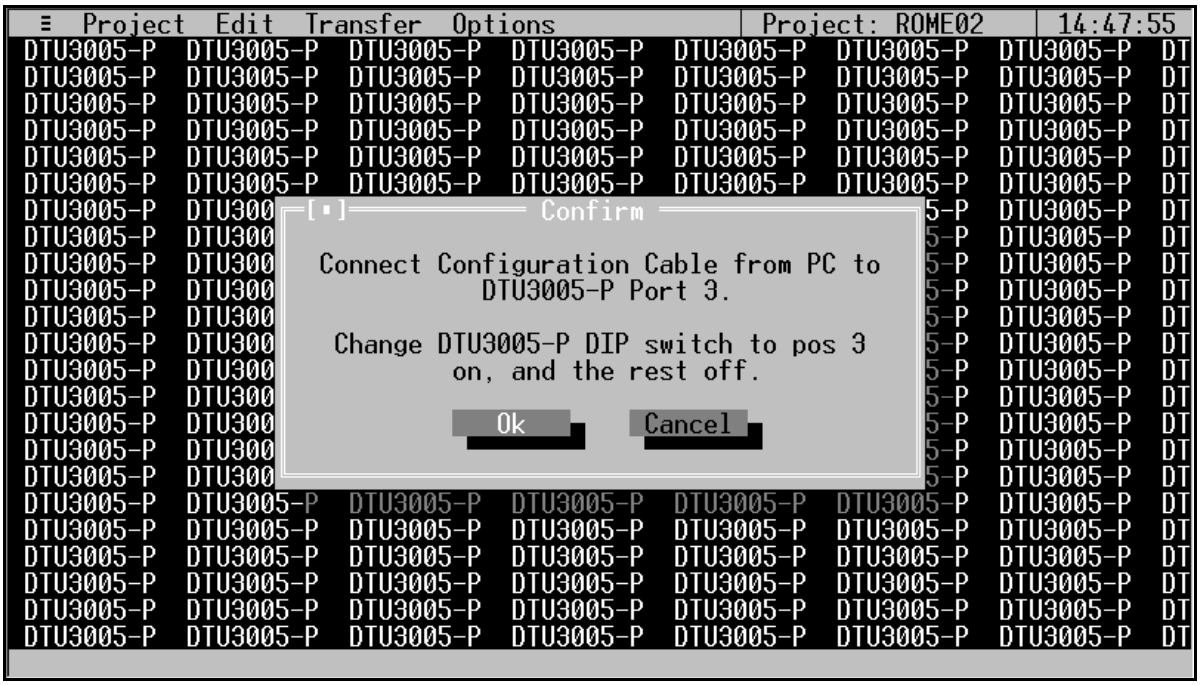

Figure 5.4 Transfer Confirmation Screen

5.3 Verifying Projects

Select **Verify** from the **Transfer** menu, and the confirmation screen shown above is displayed. Select **Ok** and the DTU3005P Editor program reads the project stored on the DTU3005P unit and compares it with the currently displayed project.

After completing the verification process, if the project files are the same, a message will display stating "Data Verified OK". If the files are different, a message will display stating which parts of the project files are different.

5.4 Checking the DTU3005P Application

Select **Check Application in DTU3005P** from the **Transfer** menu, and the confirmation screen shown above is displayed. Select **Ok** and the DTU3005P Editor program reads the project from the DTU3005P unit and reports the type of project and the firmware version.

6 Setting Options

The Options menu allows you to configure settings for the DTU3005P Editor program. These options include the directory that the program stores its project files, which COM port and printer port the program uses, and printer settings.

Until you save the option settings to a disk, any changes you make will only be effective while you are running the program. If you exit the program without saving the options to a disk, all settings will return to the default.

Select **Options** from the main menu and the Options menu is displayed (see **Figure 6.1**). The following options are available:

- **Set Directory**—Changes the location on your hard drive where project files are saved.
- **Set COM Port**—Indicates which COM port on your computer is used to upload and download projects to the DTU3005P unit.
- **Setup Printer**—Indicates which printer you want to use to print out the project file information. It also allows you to print to a file on the hard drive, and set how many lines your printer prints per page.
- **Load Options from Disk**—Loads previously saved option settings.
- **Save Options to Disk**—Saves your option settings to the hard drive and makes the current settings the default.
- **Default Options**—Resets the option settings to the original default settings.

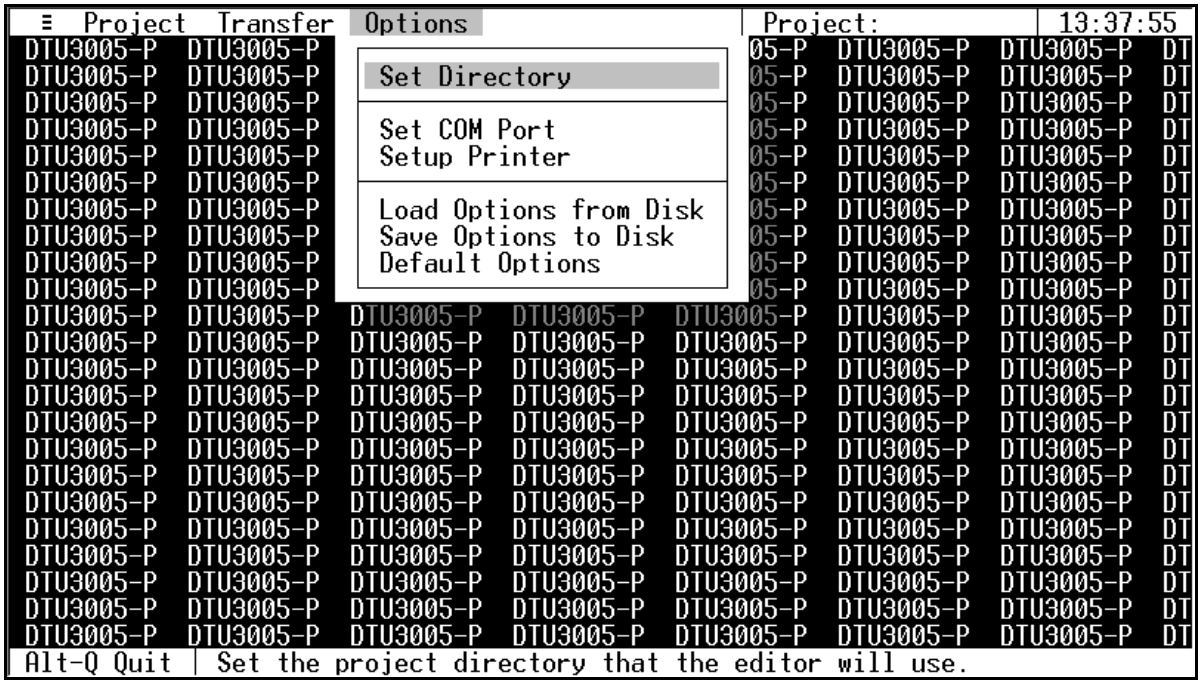

Figure 6.1 Contents of the Option Menu

6.1 Setting the Project Directory

The DTU3005P Editor program saves all the project files to a designated project directory. The default directory is named “PROJECTS” and is located inside the editor’s program directory. If you want to use a different directory or drive, you can set the new directory using the **Set Directory** command. Following are some reasons you might want to change the directory:

- To save the project files to a floppy disk or a network drive for security and archiving.
- To save the project files in the same location as other files, such as CAD drawings and specs, pertaining to your equipment.
- To save project files from different installations in separate directories.

To change the default project directory, select **Set Directory** from the Options menu. The Set Projects Directory screen is displayed (see **Figure 6.2**)

The current directory path is shown in the Directory Name field, and a graphical representation of the directory path is shown in the Directory Tree list. You may type in a new directory in the Directory Name field, or select an existing directory from the Directory Tree list.

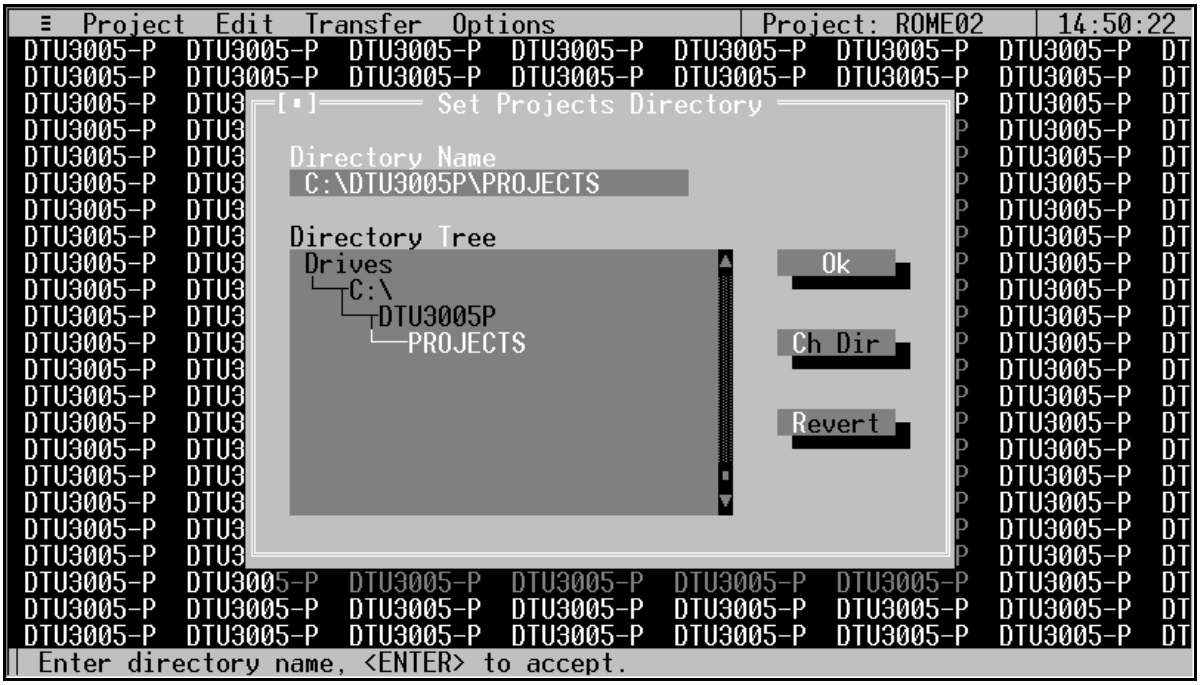

Figure 6.2 Directory Tree List

To enter a new or existing directory, place the cursor in the **Directory Name** field by pressing the **Tab** key until the directory name is selected. Type in the full path name of the directory you want to use. If the directory does not exist, the following error message is displayed (see **Figure 6.3**).

Figure 6.3 Non-existent Directory Error Message

Select **Yes** to create the new directory, or select **No** if the new directory name is not what you want.

Note: Another way to select a directory is to use the graphical Directory Tree list. Select the field by pressing **Tab** until a directory name is highlighted. Use the **Up** and **Down Arrow** keys to move up and down the directory tree. Press **Enter**, or select **Ch Dir** to see a list of all the subdirectories within the highlighted directory.

To see a list of all the available drives, including diskettes and network drives, select **Drives** and press the **Enter** key. When you select a directory, its full path name appears in the Directory Name field. To create a new subdirectory, move the cursor to the end of the path name in the Directory Name field, and type a backslash "\" and the new directory name.

After you have selected the directory, select **Ok** to confirm the selection and exit the Set Projects Directory screen. Select **Revert** to return to the previously saved directory and cancel any changes.

6.2 Selecting the COM Port

Before downloading or uploading a project file to the DTU3005P unit, you must configure the DTU3005P Editor program to use the correct communications port. The program sets COM 1 as the default port. If your mouse, modem, or other device is connected to COM 1, you must change this setting.

To change the communications port, select **Set COM Port** from the **Options** menu. The Set Communications Port screen is displayed (see **Figure 6.4**).

To select the communications port, use the **Left** and **Right Arrow** keys to select either COM 1 or COM 2. With the desired communications port selected, press the **Spacebar** to confirm your selection. The dot at the cursor indicates which COM port is selected. Select **Save** to confirm your selection, then select **Ok** to exit the screen. Select **Revert** to return to the previously saved selection.

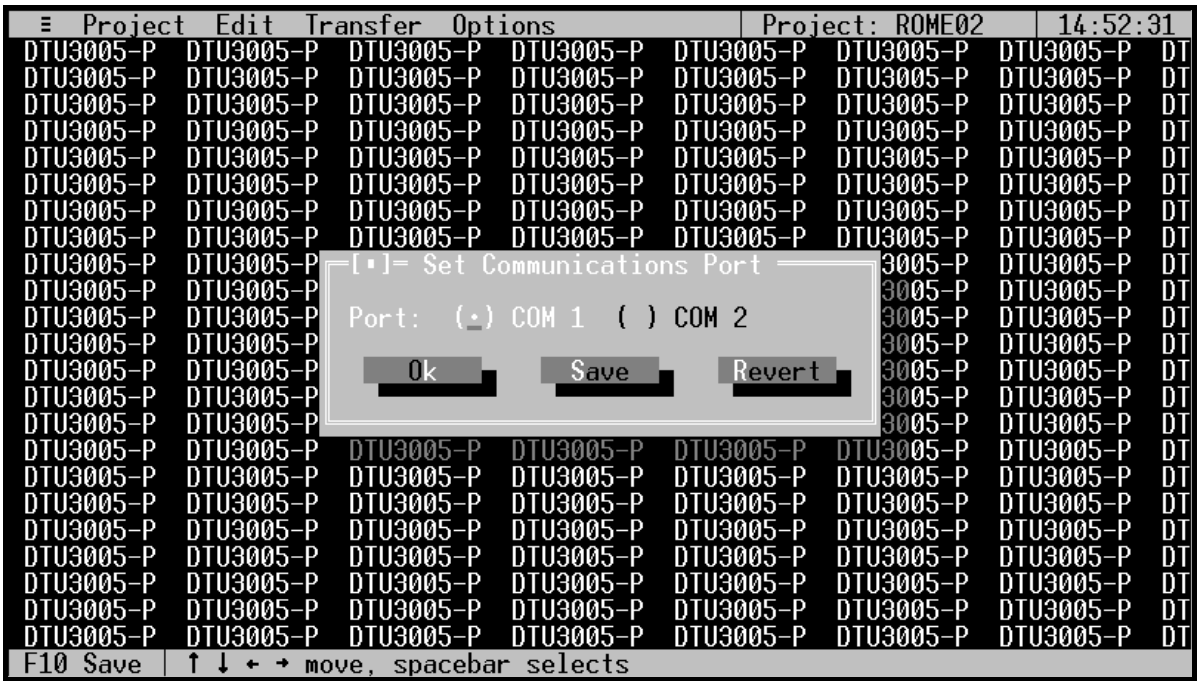

Figure 6.4 Set Communication Port Screen

6.3 Setting the Printer Options

The printer settings allow you to indicate the following information:

- the port that your printer is attached to
- print to a file that can be read by a word processing program
- the number of lines on a printed page

To change any of these settings, select **Setup Printer** from the Options menu. The following screen is displayed (see **Figure 6.5**).

To select the printer port, or to direct the printouts to a file, use the **Left** and **Right Arrow** keys to move between the File, LPT 1, and LPT 2 options. In the Destination field, with the desired selection port selected, press the **Spacebar** to confirm you selection. The dot at the cursor indicates which choice is selected.

If you selected **File**, use the **Tab** key to move the cursor to the **File Name** field. Type a name for the file containing up to eight letters and numbers. Next, enter the number of lines per page your printer prints in the **Lines/Page** field.

Note: Print out a page to determine the number of lines per page your printer prints.

Select **Save** to confirm your selections, and then select **Ok** to exit the screen. The file is saved to the DTU3005P Editor program directory. Select **Revert** to return to the previously saved settings.

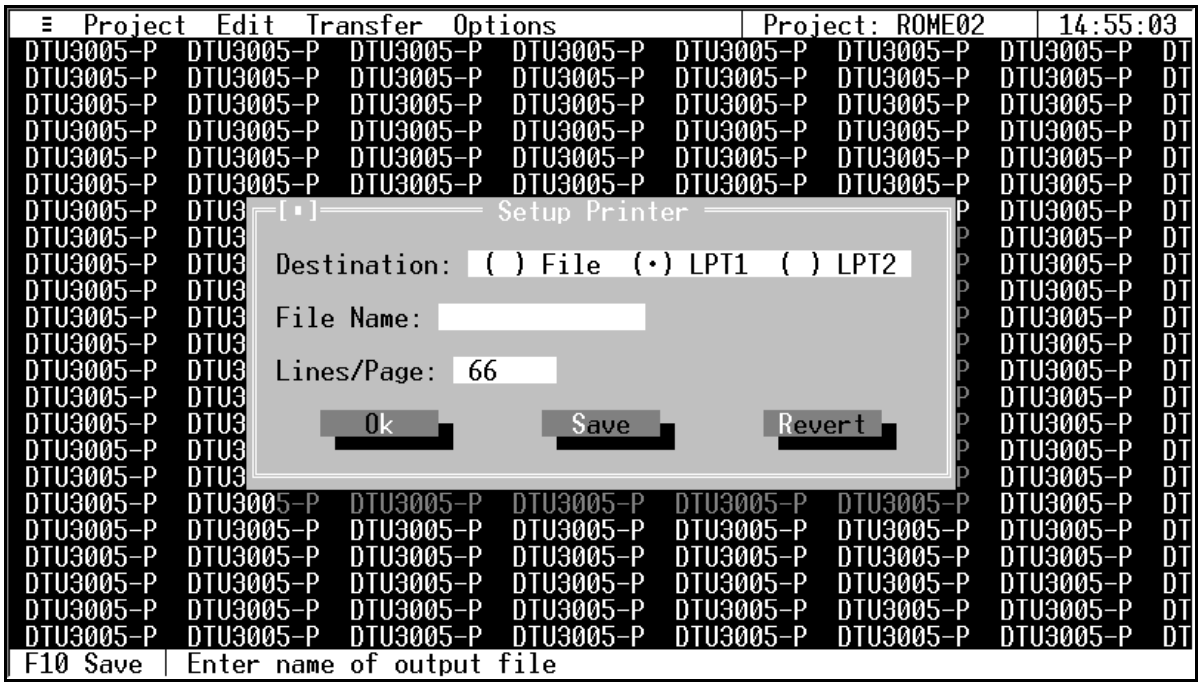

Figure 6.5 Setup Printer Screen

6.4 Loading and Saving Options

Until you save the options, the settings you have changed will be in effect until you quit the program. The next time you start the program, the previously saved options will be restored. If you have changed the options but want to restore the previously saved options, you can reload them from the hard drive. To load previously saved options settings, select **Load Options from Disk** from the Options menu. The following screen is displayed (see **Figure 6.6**).

Figure 6.6 Load Options from Disk Information Screen

If you have not previously saved your option settings, the following screen is displayed (see **Figure 6.7**).

Select **Ok** to continue.

Figure 6.7 Option Settings Error Message

To save your options settings to the hard drive, select **Save Options to Disk** from the Options menu. The following screen is displayed, indicating that the options were saved successfully (see **Figure 6.8**).

Select **Ok** to continue.

The options settings will remain in effect the next time you run the DTU3005P Editor program.

Figure 6.8 Set Options Confirmation Screen

If you want to return to the default options that were in effect when you ran the program for the first time, select **Default Options** from the Options menu. The following screen is displayed, indicating that the original settings were restored (see **Figure 6.9**).

Select **Ok** to continue.

Save the default options by selecting **Save Options to Disk** from the Options menu to ensure that these options remain in effect the next time you run the program.

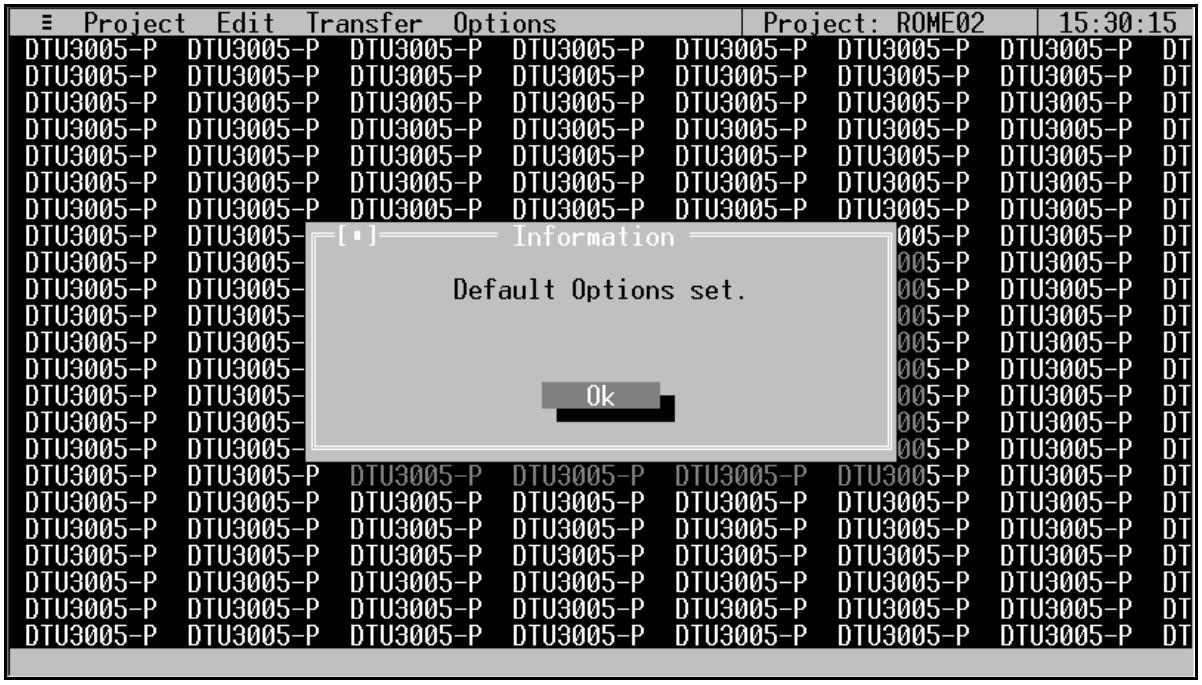

Figure 6.9 Set Default Options Confirmation Screen

6 Setting Options

7 Troubleshooting

Use this table to troubleshoot any errors that might occur when using the DTU3005P.

Problem	Possible Cause(s)	Action
Runtime error occurs when starting the program	The Editor program was started from an icon on the desktop.	Close the DOS window and start the program again. From the DOS prompt, locate the DTU3005.BAT file and execute it.
	The CPU is greater than 300 MHz.	Third-party program to slow down CPU clock speed is required.
Project is not down-loading to DTU unit	Wiring	Verify wiring from PC to DTU.
	Missing Null modem	A Null modem is required between the PC and DTU for communication.
	DTU is not in Configuration Mode	Power unit down, enable Dip Switch 3, and then power unit on. Flashing green light indicates that the DTU is in Configuration mode.
	Running software on Windows NT system	Use software only on systems running Windows 95 or 98.
DTU is not communi-cating with Profibus Master	Incorrect settings - Address - Baud Rate	Verify address and baud rate settings.
	Wiring	Verify wiring from DTU to Profibus-DP Master.
	DTU is in Configuration mode	Power down unit, turn all Dip Switches off, and then power the unit back on. Steady green light indicates that the DTU is in normal operation mode.

7 Troubleshooting

8 DTU3005P Profibus Application Notes

8.1 System Overview and Configuration

The DTU3005P is an intelligent transfer unit that transfers data between SEAbus devices on Port 2 and a Profibus-DP host on Port 1. Port 3 is used as a Passthrough port in which all messages received are simply passed through to the SEAbus devices on Port 2.

Port 3 on the DTU3005P is also used to send and receive configuration information from a personal computer running the DTU3005P Configuration software. The communications parameters (baud rate, data bits, parity, etc.) and timing parameters are configured for the SEAbus ports using this software as well as the DTU3005P address on the Profibus network.

8.2 Profibus and SEAbus Device Configuration

The list of SEAbus devices that data is transferred from can be set up in two different ways:

1. Using the DTU3005P Configuration software
2. Using the user parameter area of the Profibus-DP slave configuration sent by the Profibus host

If the SEAbus device configuration has been set up using the Configuration software, it will be overridden by a valid SEAbus device list received in the Profibus user parameter data. The format of the Parameter Data in the slave configuration is shown in **Table 8.1**.

Table 8.1 Slave Configuration Format

Byte	Designation
0	Must be set to 0
1	Number of SEAbus devices being configured
2	Device Type Code for Device 0 (1st device)*
3	SEAbus Address for 1st device
4	Device Type Code for Device 1 (2nd Device)*
5	SEAbus Address for Device 1 (2nd Device)
. . .	Device Type Code and Address for Devices 2-30*
64	Device Type Code for Device 31 (if required)*
65	SEAbus address for Device 31 (if required)

*For more information,see the device type codes list in **Section 8.4**.

Any number of parameter bytes from 0 to 65 are accepted by the DTU3005P. If the SEAbus devices are configured through the Profibus-DP interface in the user parameter data, only the number of bytes required to configure the desired number of devices is required. Additional bytes are ignored by the DTU3005P, if present.

Note: When a valid SEAbus device list is received in the user parameter area of the Profibus-DP slave configuration, the new device list is stored in non-volatile memory and used each time the DTU3005P is powered up (unless overwritten by a new Profibus-DP slave configuration message or changed with the Configuration software.)

8.3 Profibus Input/Output Configuration

The input/output configurations are provided in the Device Database file (PNTL3005.GSD) for the DTU3005P unit (see **Table 8.2**):

Table 8.2 DTU3005P Input/Output Configurations

16 Words In, 0 Words Out	24 Words In, 0 Words Out
16 Words In, 4 Words Out	24 Words In, 4 Words Out
32 Words In, 0 Words Out	40 Words In, 0 Words Out
32 Words In, 4 Words Out	40 Words In, 4 Words Out
48 Words In, 0 Words Out	56 Words In, 0 Words Out
48 Words In, 4 Words Out	56 Words In, 4 Words Out
60 Words In, 0 Words Out	
60 Words In, 4 Words Out	

8.4 Profibus Input Data

The input data transferred to the Profibus host will vary depending on the configured input length and the data read from a specific SEAbus device. When 16 words of input are configured, a special subset of the collected real-time data for each type of device is transferred.

For all other input configurations, the real-time data as presented in **Appendix C** of the DTU3005P manual is transferred. The data will be transferred exactly as presented in the manual with three exceptions:

1. Two additional words precede the real-time data, increasing the amount of data transferred by two words. The first word contains the Device Number (0-31) as configured on the DTU3005P's device list and the second word will contain the device type code as follows:

   1 = SAMMS LV
   2 = SAMMS LV
   3 = 4300 Power Meter
   4 = 4700 Power Meter
   5 = 4720 Power Meter
   6 = Statis Trip III
   7 = ISGS Switchgear
   8 = S7 I/O
   9 = SB EC

2. If the input configuration size is greater than the number of words in the real-time data list for a particular device, the unused input words at the end of the data transferred is set to 0.

3. If the input configuration size is smaller than the number of words in the real-time data list for a particular device, the words at the end of the list are not sent (they are truncated).

For examples of the real-time input data transferred to the Profibus-DP host for SAMMS devices see **Section 8.7**.

8.5 Example: Real-Time Data for SAMMS MV Devices

For an Input Configuration Size of 20, see **Table 8.3**.

Table 8.3 Input Configuration Size of 20

Word 0:	Device Number (0-31)
Word 1:	Device Type Code (2 = SAMMS MV)
Word 2:	Motor Run Time (0-65535 hours)
Word 3:	# of Motor Starts (0-65535 Starts)
Word 4:	# of Trips (0-9999 Trips)
Word 5:	Time to Restart (0-3245 seconds)
Word 6:	Winding Temperature (0-250%)
Word 7:	LED & Contactor Status
Word 8:	Current Phase A (Low Order)
Word 9:	Current Phase A (High Order)
Word 10:	Current Phase B (Low Order)
Word 11:	Current Phase B (High Order)
Word 12:	Current Phase C (Low Order)
Word 13:	Current Phase C (High Order)
Word 14:	Current Ground (Low Order)
Word 15:	Current Ground (High Order)
Word 16:	Input/Pushbutton Status

Table 8.3 Input Configuration Size of 20

Word 17:	Timing Byte (0-200 seconds)
Word 18:	Timing Byte 2 (0-200 seconds)
Word 19:	Overload Trip Class (2-23)

For an Input Configuration Size of 16, see **Table 8.4**.

Table 8.4 Input Configuration Size of 16

Word 0:	Device Number (0-31)
Word 1:	Device Type Code (2 = SAMMS MV)
Word 2:	Motor Run Time (0-65535 hours)
Word 3:	# of Motor Starts (0-65535 Starts)
Word 4:	# of Trips (0-9999 Trips)
Word 5:	Time to Restart (0-3245 seconds)
Word 6:	Winding Temperature (0-250%)
Word 7:	LED & Contactor Status
Word 8:	Current Phase A (Low Order)
Word 9:	Current Phase A (High Order)
Word 10:	Current Phase B (Low Order)
Word 11:	Current Phase B (High Order)
Word 12:	Current Phase C (Low Order)
Word 13:	Current Phase C (High Order)
Word 14:	Current Ground (Low Order)
Word 15:	Current Ground (High Order)

Note: The Control Parameters and Ambient Temperature will not be sent because all 20 input words are already used. An input configuration size of 24 Words is required to receive all currently used data for the SAMMS devices.

8.6 Profibus Output Data

Output data transferred from the Profibus host to the DTU3005P is used to tell the DTU3005P to issue commands to the devices. Examples of these commands are Reset KWH Counters, Turn a Relay On or Off, or Change a parameter value like the Timing Byte for the SAMMS device. Use of the output data from the Profibus host to the DTU3005P is optional. When output words are configured, exactly four words will be transferred from the Profibus-DP host to the DTU3005P. For the format of these words, see **Table 8.5**.

Table 8.5 Profibus-DP Word Format

Word 0:	Device Number 0-31 as configured on the DTU3005P
Word 1:	Device Type Code See **Section 8.4** - Profibus Input Data for list codes.

Table 8.5 Profibus-DP Word Format

Word 2:	Command Number Specifies the command to perform. Command numbers are different for each type of device and can be found in the Device Command Data Received from PLC section for each device in **Appendix C**.
Word 3:	Data Value Data required for the command as shown in **Appendix C**. Some commands do not require any data values. In this case, the value of this word is ignored.

The procedure that the Profibus host must follow to issue commands through the output data word is as follows:

1. Set the command number word to 0, which tells the DTU3005P that the command data is not valid or no command is currently requested.
2. Set the Device Number, Device Type Code, and Data Value to the appropriate values.
3. Set the Command Number to the appropriate value.

The DTU3005P processes only the command one time after any word of the output data is changed. By setting the Command Number to 0 while changing any other words in the output data, no undesired commands are processed.

Most commands issued by the Profibus host will result in feedback in the real-time data so the host should know when the command is received by the DTU3005P and it is safe to change the output data to issue a new command.

8.7 Input Data to Host Transfer Method

When only one device is configured, that device's real-time data is continually transferred to the Profibus-DP host. When multiple devices are configured, there are two ways that the DTU3005P can be configured to alternate between sending the data for each device.

Method 1

The first method is to specify a delay time. The DTU3005P can be configured to send Device 0's data until the delay time has expired then it automatically switches over to send Device 1's data for the same time period. It repeats this process in Device number order for each device in the list of configured devices. When the last device's data has been sent and the delay time has expired, the DTU3005P begins sending Device 0's data again.

Method 2

The second method requires the use of the output data (4 output words) that are transferred from the Profibus-DP host to the DTU3005P. A command number of 255 is used to request the device's real-time data the Profibus host wants to receive. When command number 255 is received in the third word of the output data, the DTU3005P begins sending the real-time data for the device number and device type specified in the first and second words of the output data (see **Table 8.5**). It will continue sending the data for that device until another command number 255 is received to switch to a different device. This process allows the Profibus host to tell the DTU3005P when it has received the latest real-time data for one device and is ready for data from the next device. The Profibus host will leave the output data set until it has received the requested device's data to verify that the DTU3005P has received the request to switch to a particular device.

8.8 DTU3005P Diagnostic Data

A total of 24 bytes of Diagnostics Information is sent to the Profibus-DP host. See **Table 8.6** for the format for these bytes.

Table 8.6 Byte Format Sent to Profibus-DP Host

Byte 0:	Station Status_1 defined in Profibus-DP specification
Byte 1:	Station Status_2 defined in Profibus-DP specification
Byte 2:	Station Status_3 defined in Profibus-DP specification
Byte 3:	Diag. Master_Add defined in Profibus-DP specification
Byte 4:	Ident_Number_High defined in Profibus-DP specification
Byte 5:	Ident_Number_Low defined in Profibus-DP specification
Byte 6:	Diag_Length (Always set to 0x12)
Byte 7:	SEAbus Device Status Mask (Devices 31-24)
Byte 8:	SEAbus Device Status Mask (Devices 23-16)
Byte 9:	SEAbus Device Status Mask (Devices 15-08)
Byte 10:	SEAbus Device Status Mask (Devices 07-00)
Byte 11:	SEAbus Device No Response Count (High Word, High Byte)
Byte 12:	SEAbus Device No Response Count (High Word, Low Byte)
Byte 13:	SEAbus Device No Response Count (Low Word, High Byte)
Byte 14:	SEAbus Device No Response Count (Low Word, Low Byte)
Byte 15:	SEAbus Device Data Error Count (High Word, High Byte)

Table 8.6 Byte Format Sent to Profibus-DP Host

Byte 16:	SEAbus Device Data Error Count (High Word, Low Byte)
Byte17:	SEAbus Device Data Error Count (Low Word, High Byte)
Byte 18:	SEAbus Device Data Error Count (Low Word, Low Byte)
Byte 19:	Reserved (Set to 0 for now)
Byte 20:	Reserved (Set to 0 for now)
Byte 21:	Reserved (Set to 0 for now)
Byte 22:	Reserved (Set to 0 for now)
Byte 23:	Reserved (Set to 0 for now)

SEAbus Device Status Mask

The Device Status Mask contains 1 bit for each device. A bit will be a "1" if the device is configured but not responding when the DTU3005P attempts to communicate with it. Otherwise, the bit will be a "0."

SEAbus Device No Response Count

The "No Response Count" is incremented each time an attempt is made to communicate with a configured device and it does not respond. This count is reset to zero each time the DTU3005P is powered up or reset.

SEAbus Device Data Error Count

The "Data Error Count" is incremented with each occurance of a communication data error (character framing error, parity error, message check sum error, or partial or bad response received). This count is reset to zero each time the DTU3005P is powered up or reset.

8.9 DTU3005P Profibus Slave Address

The DTU3005P supports the Set Slave Address function. Whenever the address is changed through the Profibus interface with the Set Slave Address function from the Profibus-DP host, the new address is stored in non-volatile memory and is used each time the DTU3005P is powered up (unless changed through the Profibus interface or with the Configuration software).

8.10 DTU3005P Operation Modes

The DTU3005P has two operation modes that are selected by positions 1-3 of the Dip Switch on the front of the DTU3005P. Please note that whenever the DTU3005P detects that the Dip Switch is being changed, it will stop the current operation mode and wait 5 seconds for the change to be completed before entering the new operation mode.

The operation modes are as follows:

Normal Operation Mode

Dip Switch Setting: 3 off, 2 off, 1 off

In this mode, the DTU3005P will first wait for configuration from the Profibus host before initiating communication with the configured SEAbus devices. However, any SEAbus messages received on the Passthrough port (Port 3) are passed through to the SEAbus devices.

After configuration is received from the Profibus host and data exchange is in progress, the LED on the side of the unit will turn on. Data is transferred between the SEAbus devices and the Profibus host. The Status LED on the front of the DTU3005P is green when in Data Exchange Mode with the Profibus host and red at all other times when in Normal Operations Mode.

Configuration Mode

Dip Switch Setting: 3 on, 2 off, 1 off

In this mode, the Profibus port (Port1) and SEAbus port (Port 2) are not active. A Null-Modem cable (has pins 2 and 3 crossed) is connected from Port 3 of the DTU3005P to the personal computer running the Configuration software.

The Status LED flashes green when in Configuration Mode.

Note: Instructions for the Configuration Mode are displayed on the personal computer's monitor whenever the Configuration software is attempting to communicate with the DTU3005P.

8.11 DTU3005P Port Status LEDs

The LED above each port flashes green when data is transmitted and flashes red when data is received.

8.12 DTU3005P Port Pinouts

Port 1 is the Profibus port on the side of the unit and has the standard Profibus pinout. Ports 2 and 3 have both RS232 and RS422/485 signals available, but connection should only be made to one set of signals at a time. The pinouts for both the 232 and 422/485 modes are shown in **Table 8.7**.

Table 8.7 Pinouts for RS 232 and 422/485

RS-232 Connection		**RS-422/485 Connection**	
Pin	Signal Name	Pin	Signal Name
1	FG - Frame Ground	16	CTS -

Table 8.7 Pinouts for RS 232 and 422/485

RS-232 Connection		RS-422/485 Connection	
2	TD - Transmit Data	17	CTS +
3	RD - Receive Data	18	RTS +
4	RTS - Request to Send	19	RTS +
5	CTS - Clear to Send	21	TX -
7	SG - Signal Ground	22	RX -
		23	TX +
		24	RX +

8 DTU3005P Profibus Application Notes

A Supported Devices

The following Siemens ACCESS devices are supported by the DTU3005P.

Table A.1 Supported Siemens Devices

Device
4720 Power Meter
4700 Power Meter
4300 Power Meter
Static Trip III Trip Unit
SAMMS-MV Motor Protection Device
SAMMS-LV Motor Protection Device
ISGS Intelligent SwitchGear System Protective Relay
S7-I/O Addressable Relay
Sentron SB Energy Communicating Trip Unit
StaticTrip III
SB-TL
Pulse Reading Meter (PRM)

In addition, the following Siemens protective relays and measuring transducers using the VDEW protocol can be connected using the DTU3005P. This device is designed for use with DIGSI Configuration software. SEAbus port expander mode is not supported for this device.

Table A.2 Supported Siemens Protective Relays and Measuring Transducers

Device
7SA511 Feeder Protection Relay
7SA513 EHV Line Protection Relay
7SD511 Current Comparison Protection Relay
7SD512 Current Comparison Protection Relay
7SJ511 Overcurrent Protection Relay
7SJ512 Feeder Protection Relay
7SJ531 Line and Motor Protection Relay
7SJ600 Overcurrent Protection Relay
7UT512 Differential Protection Relay
7UT513 Differential Protection Relay
7KG6000 (SIMEAS T) Measuring Transducer

A.1 Communication Port settings for 7-Series Protective Relays.

Following are the required settings in the relays for communications.

All relays (except 7SJ600)

Table A.3 7200 Rear port settings

Menu Number	Menu	Setting
7201	Device Address	Set to a unique address to be used in the DTU.
7208	Function Type	This must be left at it's default value of "176"
7221	Rear Port Parity	Set this to 8N1, 8 data bits, no parity, and 1 stop bit.
7222	Rear Format	Set this to "VDEW Extension"
7225	Rear Baud	Set this to match the baud rate of the configuration in the DTU.

7SJ600

Table A.4 72 Port Settings

Menu	Setting
DEVICE	Set to a unique address, between 1 and 254, which will be used in the DTU
F-TYPE	This should be left at it's default value of "160"
PC-INT	Data format of this interface should be set to "DIGSI V3"
BAUD	Set this to match the baud rate as configured in the DTU
PARITY	Set this to 8N1, 8 Data Bits, No Parity Bits, and 1 stop bit

Appendix A: Supported Devices

B Installing the Hardware

The DTU3005P device is a compact, low-power, sealed device designed for use in an industrial environment. It can be mounted on any flat surface inside equipment cabinets requiring only nominal ventilation for convection cooling. Four inches clearance in front of the unit is required for attachment of communication cables. A modular connector is supplied for unit power.

B.1 Dimensions

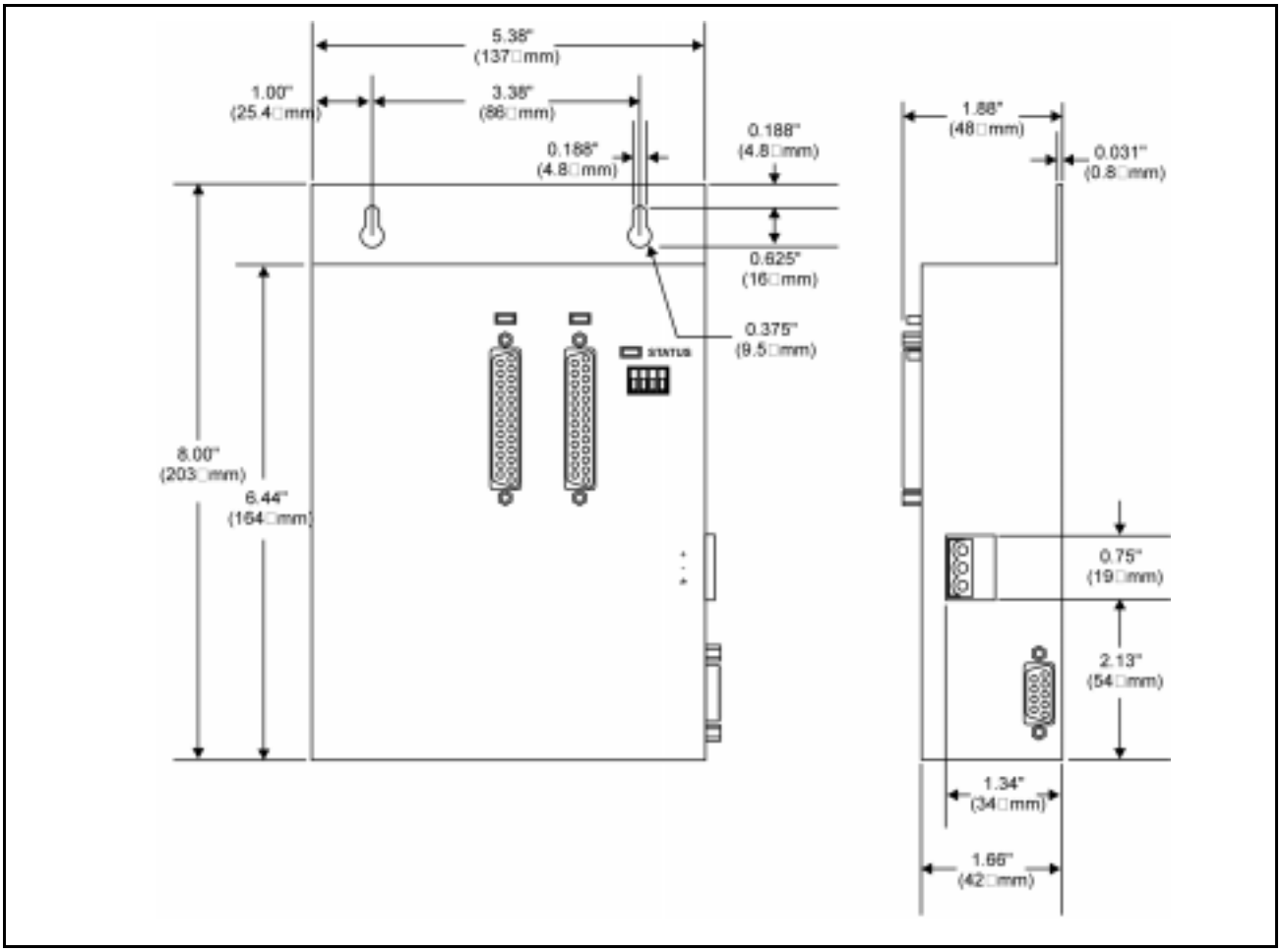

Figure B.1 DTU3005P Device Dimensions

B.2 Power Requirements

The DTU3005P device requires a DC power supply of 7 to 35 VDC rated at 500 mA at 9 VDC. The power supply connector is provided with the device. The DTU3005P device can be powered from an off-the-shelf DC power supply. The voltage polarity is marked on the front of the DTU3005P unit.

Appendix B: Installing the Hardware

C Device Data Format

This appendix contains the real-time device data and command registers for each of the supported Siemens devices.

C.1 Device Type: SAMMS LV and MV

Real-Time Device Data Stored in PLC (SAMMS LV and MV)

Real-Time Data	Register Location in PLC Block	Range or Contents
Motor Run Time	0	0...65535 hours
# of Motor Starts	1	0...65535 starts
# of Trips	2	0...9999 trips
Time to Restart	3	0...3425 seconds
Winding Temperature	4	0...250 (% of Full Load)
LED & Contactors Note: When bit numbers are specified, Bit 15 is the highest order bit in the PLC register.	5	**Bit** **Contents** 15 Impending Trip LED 14 Incomplete Sequence LED 13 Overload Trip LED 12 Current Unbalance LED 11 External Trip LED 10 CPU Fault LED 9 Ground Fault LED 8 Contactor No. 3 7 Stop/Off LED (L1) 6 Forward/Low LED (L2) 5 Reverse/High LED (L3) 4 Hand LED 3 Off LED 2 Auto LED 1 Contactor No. 1 0 Contactor No. 2
Current Phase A	6—7	0.0001 amperes (10000 = 1 A)
Current Phase B	8—9	0.0001 amperes (10000 = 1 A)
Current Phase C	10—11	0.0001 amperes (10000 = 1 A)
Current Ground	12—13	0.0001 amperes (10000 = 1 A)
Note: In the above Current values (A, B, C, Ground), each one occupies two consecutive PLC registers. The low numbered PLC register contains the low order 16 bits and the higher numbered PLC register contains the high order 16 bits.		
Input Status and Pushbutton Status	14	**Bit** **Contents** 15 Not Used 14 Not Used 13 Remote Input No. 1 12 Remote Input No. 2 11 Remote Input No. 3 10 Remote Input No. 4 9 Spare 8 Not Used 7 Not Used 6 Not Used 5 Auto Button 4 Off Button 3 Hand Button 2 Left, Rev. Button 1 Start, On Button 0 Stop, Off Button
Timing Byte 1	15	0...200 seconds
Timing Byte 2	16	0...200 seconds
Overload Trip Class	17	2...23

Real-Time Device Data Stored in PLC (SAMMS LV and MV) (Continued)

Real-Time Data	Register Location in PLC Block	Range or Contents
Control Parameters	18	**Bit** **Contents** 7 Ground Fault Enable 6 Service Factor (0 = 10) 5 Auto Reset Enable 4 Phase Unbalance Enable 3 Emergency Reset Enable 2 Jam Protection Enable 1 Loss of Load Enable 0 Reserved
Ambient Temperature	19	0...70 Degrees C
Reserved	20 –23	For Future Expansion

Device Command Data Retrieved From PLC (SAMMS LV and MV)

First Command Word (Command Word)	Second Command Word (Data or Value)
0 = No Command to Perform	Unused for Command 0
1 = Change Timing Byte 1	New value for timing byte 1 (0–200 seconds)
2 = Change Timing Byte 2	New value for timing byte 2 (0–200 seconds)
3 = Force Pushbutton On	**Pushbutton to force on** 1 = Stop/Off Button 2 = Start/On Button 3 = Left/Reverse Button 4 = Hand Button 5 = Off Button 6 = Auto Button 7 = Reserved for Later Use 8 = Reset after Trip
4 = Change Overload Trip	Overload Trip Class (2–23)
5 = Change Ground Fault	(0 = Warning, 1 = Protection Enabled)
6 = Change Phase Unbalance	(0 = Protection Disabled, 1 = Enabled)
7 = Change Ambient Temperature	Ambient Temperature (0–70)

C.2 Device Type: 4300 Power Meter

Real-Time Device Data Stored in PLC (4300 Power Meter)

Real-Time Data	Register Location in PLC Block	Range or Contents
Power Factor	0	0...1000, 0.1 percent
PF Lag/Lead	1	0 = Unity, 1 = Lag, 2 = Lead
Voltage L-N Phase A	2—3	0...999999 V
Voltage L-N Phase B	4—5	0...999999 V
Voltage L-N Phase C	6—7	0...999999 V
Voltage L-L Phase AB	8—9	0...999999 V
Voltage L-L Phase BC	10—11	0...999999 V
Voltage L-L Phase CA	12—13	0...999999 V
Current Phase A	14	0...65000 A
Current Phase B	15	0...65000 A
Current Phase C	16	0...65000 A
Kilowatts	17—18	-999999...999999 kW
Kilowatt Demand	19—20	-999999...999999 kW Max
Maximum Kilowatt Demand	21—22	-999999...999999 kW
Kilowatt Hours (net)	23—24	-999999999...999999999 kWH
Frequency	25	0...32767, 0.1 Hz
Kilovolt-Amperes	26—27	0...999999 kVA
Kilovolt-Amperes Reactive	28—29	0...999999 kVAR
Reserved	30—33	For Future Expansion

Device Command Data Retrieved From PLC (4300 Power Meter)

First Command Word (Command Word)	Second Command Word (Data or Value)
0 = No Command to Perform	Unused for Command 0
1 = Reset Max Kilowatt Demand	Unused for Command 1
2 = Reset Kilowatt Hours	Unused for Command 2

C.3 Device Type: 4700 Power Meter

Real-Time Device Data Stored in PLC (4700 Power Meter)

Real-Time Data	Register Location in PLC Block	Range or Contents
Voltage L-N Phase A	0—1	0...999999 V
Voltage L-N Phase B	2—3	0...999999 V
Voltage L-N Phase C	4—5	0...999999 V
Voltage L-L Phase AB	6—7	0...999999 V
Voltage L-L Phase BC	8—9	0...999999 V
Voltage L-L Phase CA	10—11	0...999999 V
Current Phase A	12	0...9999 A
Current Phase B	13	0...9999 A
Current Phase C	14	0...9999 A
Current N (I4)	15	0...9999 A
Kilowatts	16—17	-999999...999999 kW
Kilovolt-Amperes Reactive	18—19	0...999999 kVAR
Kilowatt Demand	20—21	-999999...999999 kW
Power Factor	22	60.....100
PF Lag/Lead	23	0 = Unity, 1 = Lag, 2 = Lead
Frequency	24	400...700, 0.1 Hz
Auxiliary Voltage	25—26	0...999999 V
Average Current Demand	27	0...9999 A
Kilowatt Hours (forward)	28—29	0...1,000,000,000 kWH
Kilowatt Hours (reverse)	30—31	0...1,000,000,000 kWH
Kilovolt-Amperes Reactive Hours (Total)	32—33	0...999999 kVARH
Kilovolt-Amperes (Total)	34—35	0...999999 kVA
Input/Output Status Note: When bit numbers are specified, Bit 15 is the highest order bit in the PLC register.	36	**Bit** **Contents** 15 Discrete Input S3 (1 = On) 14 Discrete Input S2 (1 = On) 13 Discrete Input S1 (1 = On) 12 Relay 3 (1 = Closed) 11 Relay 2 (1 = Closed) 10 Relay 1 (1 = Closed) 9 Not Used 8 Setpoint 17 Reached 7 Not Used 6 Not Used 5 Flag New Snapshot 4 Flag Diagnostic Fail 3 Flag New Min/Max 2 Flag New Event 1 Flag Alarm Status Change 0 Discrete Input S4 (1 = On)
Reserved	37—41	For Future Expansion

Device Command Data Retrieved From PLC (4700 Power Meter)

First Command Word (Command Word)	Second Command Word (Data or Value)
0 = No Command to Perform	Unused for Command 0
1 = Reset all Demand Min/Max	Unused for Command 1
2 = Reset kW and kVAR Hours	Unused for Command 2
3 = Close Relay	Relay Number (1–3)
4 = Open Relay	Relay Number (1–3)

C.4 Device Type: 4720 Power Meter

Real-Time Device Data Stored in PLC (4720 Power Meter)

Real-Time Data	Register Location in PLC Block	Range or Contents
Voltage L-N Phase A	0–1	0...99999999 V
Voltage L-N Phase B	2–3	0...99999999 V
Voltage L-N Phase C	4–5	0...99999999 V
Voltage L-L Phase AB	6–7	0...99999999 V
Voltage L-L Phase BC	8–9	0...99999999 V
Voltage L-L Phase CA	10–11	0...99999999 V
Auxiliary Voltage	12–13	0...999999 V
Current Phase A	14	0...9999 A
Current Phase B	15	0...9999 A
Current Phase C	16	0...9999 A
Current N (I4)	17	0...9999 A
Current Demand Phase A	18	0...9999 A
Current Demand Phase B	19	0...9999 A
Current Demand Phase C	20	0...9999 A
Kilowatts	21–22	-99999999...99999999 kW
Kilowatt Demand	23–24	-99999999...99999999 kW
Kilowatt Hours (total)	25–26	0...1,000,000,000 kWH
Kilowatt Hours (reverse)	27–28	0...1,000,000,000 kWH
Kilovolt-Amperes Reactive	29–30	0...999999 kVAR
Power Factor	31	0...100
PF Lag/Lead	32	0 = Unity, 1 = Lag, 2 = Lead
Frequency	33	0...6000, 0.01 Hz
Current I1 HD - Total	34	0...9999 A
Current I2 HD - Total	35	0...9999 A
Current I3 HD - Total	36	0...9999 A
Voltage Vl HD - Total	37–38	0...99999999 V
Voltage V2 HD - Total	39–40	0...99999999 V
Voltage V3 HD - Total	41–42	0...99999999 V
Sliding Win Kilowatt Demand	43–44	0...99999999 kW
Predicted Slide Win Kilowatt	45–46	0...99999999 kW
Kilovolt-Amperes (Total)	47–48	0...99999999 kVA
Kilovolt-Amperes Reactive Hours (Total)	49–50	0...99999999 kVARH
Input Status	51	Bits 0–3: Inputs 1–4
Relay Status	52	Bits 0–2: Relays 1–3
Reserved	53–57	Future Expansion

Device Command Data Retrieved From PLC (4720 Power Meter)

First Command Word (Command Word)	Second Command Word (Data or Value)
0 = No Command to perform	Unused for Command 0

Device Command Data Retrieved From PLC (4720 Power Meter)

First Command Word (Command Word)	Second Command Word (Data or Value)
1 = Reset all Demand Min/Max	Unused for Command 1
2 = Reset all Hours Counters	Unused for Command 2
3 = Close Relay	Relay Number (1-3)
4 = Open Relay	Relay Number (1-3)

C.5 Device Type: Static Trip III

Real-Time Device Data Stored in PLC (Static Trip III)

Real-Time Data	Register Location in PLC Block	Range or Contents
Current Phase A	0	0...65000 A
Current Phase B	1	0...65000 A
Current Phase C	2	0...65000 A
Current Ground	3	0...65000 A
Voltage L-N Phase A	4	0...400 V
Voltage L-N Phase B	5	0...400 V
Voltage L-N Phase C	6	0...400 V
Voltage L-L Phase AB	7	0...660 V
Voltage L-L Phase BC	8	0...660 V
Voltage L-L Phase CA	9	0...660 V
Kilowatts	10	-32000...32000 kW
Kilowatt Demand	11	-32000...32000 kW
Kilowatt Hours (Total)	12–13	-9999999...9999999 kWH
Kilowatt Hours (Reverse)	14–15	-9999999...0 kWH
Kilovolt-Amperes Reactive	16	-32000...32000 kVAR
Power Factor	17	-100...100
Frequency	18	400...700, 0.1 Hz
Breaker Counter	19	0...65000 cycles
Comm Status Note: When bit numbers are specified, Bit 15 is the highest order bit in the PLC register.	20	**Bit** **Contents** 15 Breaker failed to open 14 Comm Trip Brkr active 13 Current unbal. pickup 12 Comm Phase Unbalance 11 Comm Close Brkr active 10 Digital Shadow Protect 9 Max Data Activity 8 Breaker Pos (1 = closed) 7 Reverse Power pickup 6 Over Frequency pickup 5 Under Frequency pickup 4 Overvoltage pickup 3 Undervoltage pickup 2 Voltage unbal. pickup 1 Remote Trip 0 Min Data Activity
Breaker Status	21	**Bit** **Contents** 15 ST UP Disabled Target 14 Long-time Overload 13 Short Circuit Target 12 Ground Fault Target 11 Voltage Unbal. Target 10 Zone Interlock Out 9 Current Unbal. Target 8 Long-time Pickup 7 Reverse Power Target 6 Over Frequency Target 5 Under Frequency Target 4 Overvoltage Target 3 Undervoltage Target 2 Instantaneous Bypass 1 ST Local Cmd to Trip 0 Static Trip Reset

Real-Time Device Data Stored in PLC (Static Trip III) (Continued)

Real-Time Data	Register Location in PLC Block	Range or Contents
Alarm Status	22	**Bit** **Contents** 15 Overvoltage Setpoint 14 Voltage Unbalance Setpoint 13 Undervoltage Setpoint 12 Current Unbalance Setpoint 11 Neutral Overcurrent 10 Ground Overcurrent 9 Overcurrent Setpoint 8 Aux. Relay Closed 7 New Data in Alarm Log 6 Not Used 5 Not Used 4 Processor Error 3 Energy Value Overflow 2 EEPROM Data Corrupted 1 Function Range Error 0 Calibration Error
Reserved	23—25	For Future Expansion

Device Command Data Retrieved From PLC (Static Trip III)

First Command Word (Command Word)	Second Command Word (Data or Value)
0 = No Command to Perform	Unused for Command 0
1 = Reset Kilowatt Demand	Unused for Command 1
2 = Reset Kilowatt Hours (Total and Reverse)	Unused for Command 2
3 = Close Breaker	Unused for Command 3
4 = Open Breaker	Unused for Command 4
5 = Clear Targets and Trip Status	Unused for Command 5
6 = Close Auxiliary Contact	Unused for Command 6
7 = Open Auxiliary Contact	Unused for Command 7

C.6 Device Type: SensiTrip III

Real-Time Device Data Stored in PLC (SensiTrip III)

Real-Time Data	Register Offset	Range or Contents
MT Status	0	2 Byte ASCII string
Zone Interlock Status	1	High Order Byte: Ground Fault Zone Low Order Byte: Short Time Zone
Device Type	2	00h = No Device 01h = MCCB/ICCB 02h = STIIIC/CP
Phase A Current (Gain Off)	3	0...65535 (must be scaled)
Phase B Current (Gain Off)	4	0...65535 (must be scaled)
Phase C Current (Gain Off)	5	0...65535 (must be scaled)
Ground Fault Current (Gain Off)	6	0...65535 (must be scaled)
Phase A Current (Gain On)	7	0...65535 (must be scaled)
Phase B Current (Gain On)	8	0...65535 (must be scaled)
Phase C Current (Gain On)	9	0...65535 (must be scaled)
Ground Fault Current (Gain On)	10	0...65535 (must be scaled)
Reserved	11-13	For Future Expansion
Breaker Status	14	2 Byte ASCII string
Configuration Switch	15	Switch setting (0...255)
Continuous Current Switch	16	Switch setting (0...255)
Long Time Delay Switch	17	Switch setting (0...255)
Instantaneous Pickup Switch	18	Switch setting (0...255)
Short Time Pickup Switch	19	Switch setting (0...255)
Short Time Delay Switch	20	Switch setting (0...255)
Ground Fault Pickup Switch	21	Switch setting (0...255)
Ground Fault Delay Switch	22	Switch setting (0...255)
Trip Unit Frame Type Code	23	ASCII character code MCCB Types: J, L, M, N, P SB Types: S
Trip Unit Frame Rating Code	24	2 Byte ASCII string
Display Module Type	25	00h = None 01h = Load Monitor 02h = Ground Fault Monitor
Display Module Switch	26	Switch setting (00...09)
MTA Software Version	27	0100h-0999h (0100h=Version 1.00)
Device Software Version	28	0100h-0999h (0100h=Version 1.00)
Reserved	29-33	For Future Expansion

Note: No Commands from this device are supported.

C.7 Device Type: SB-TL

Real-Time Device Data Stored in PLC (SB-TL)

Real-Time Data	Register Offset	Range or Contents
MT Status	0	2 Byte ASCII string
Zone Interlock Status	1	High Order Byte: Ground Fault Zone Low Order Byte: Short Time Zone
Device Type	2	00h = No Device 01h = MCCB/ICCB 02h = STIIIC/CP
Phase A Current (Gain Off)	3	0...65535 (must be scaled)
Phase B Current (Gain Off)	4	0...65535 (must be scaled)
Phase C Current (Gain Off)	5	0...65535 (must be scaled)
Ground Fault Current (Gain Off)	6	0...65535 (must be scaled)
Phase A Current (Gain On)	7	0...65535 (must be scaled)
Phase B Current (Gain On)	8	0...65535 (must be scaled)
Phase C Current (Gain On)	9	0...65535 (must be scaled)
Ground Fault Current (Gain On)	10	0...65535 (must be scaled)
Reserved	11-13	For Future Expansion
Breaker Status	14	2 Byte ASCII string
Configuration Switch	15	Switch setting (0...255)
Continuous Current Switch	16	Switch setting (0...255)
Long Time Delay Switch	17	Switch setting (0...255)
Instantaneous Pickup Switch	18	Switch setting (0...255)
Short Time Pickup Switch	19	Switch setting (0...255)
Short Time Delay Switch	20	Switch setting (0...255)
Ground Fault Pickup Switch	21	Switch setting (0...255)
Ground Fault Delay Switch	22	Switch setting (0...255)
Trip Unit Frame Type Code	23	ASCII character code MCCB Types: J, L, M, N, P SB Types: S
Trip Unit Frame Rating Code	24	2 Byte ASCII string
Display Module Type	25	00h = None 01h = Load Monitor 02h = Ground Fault Monitor
Display Module Switch	26	Switch setting (00...09)
MTA Software Version	27	0100h-0999h (0100h=Version 1.00)
Device Software Version	28	0100h-0999h (0100h=Version 1.00)
Reserved	29-33	For Future Expansion

Note: No Commands from this device are supported.

C.8 Device Type: Pulse Reading Meter (PRM)

Real-Time Device Data Stored in PLC (PRM)

Real-Time Data	Register Location in PLC Block	Range or Contents
Instantaneous kW	0-1	0...4294967295 kW
kW demand (30 minutes)	2-3	0...4294967295 kW
Peak kW (30 minutes)	4-5	0...4294967295 kW
kW Hours	6-7	0...4294967295 kWh
kW demand (5 minutes)	8-9	0...4294967295 kW
New Snapshot Since Last	10	0 = No, 1 = Yes
Minutes Between Snaps	11	5, 30 minutes
Max Number of Snaps	12	1..65535 (snaps x 12)
Number of Hours Ago	13	0...65535 hours
Snapshot Year	14	0...99 (Modulo 100)
Snapshot Month	15	1..12 Month
Snapshot Day	16	1..31 Day
Snapshot Hours	17	0...23 Hours
Snapshot Minutes	18	0...59 Minutes
Snapshot Seconds	19	0...59 Seconds
Snapshot (most recent)	20-21	0...4294967295 kW
Snapshot	22-23	0...4294967295 kW
Snapshot	24-25	0...4294967295 kW
Snapshot	26-27	0...4294967295 kW
Snapshot	28-29	0...4294967295 kW
Snapshot	30-31	0...4294967295 kW
Snapshot	32-33	0...4294967295 kW
Snapshot	34-35	0...4294967295 kW
Snapshot	36-37	0...4294967295 kW
Snapshot	38-39	0...4294967295 kW
Snapshot	40-41	0...4294967295 kW
Snapshot (least recent)	42-43	0...4294967295 kW
1/1000 kWh Per Pulse	44	0...65535 (0.000 kWh)
Reserved	45-49	For Future Expansion

Device Command Data Retrieved From PLC (Pulse Reading Meter)

First Command Word (Command Word)	Second Command Word (Data or Value)
0 = No Command to Perform	Unused for Command 0
1 = Clear Kilowatt Hours	Unused for Command 1
2 = Clear Peak kW Demand	Unused for Command 2
3 = Set kW Hours Per Pulse	1/1000 kWh Per Pulse (in 0.001 kWh)

C.9 Device Type: ISGS

Real-Time Device Data Stored in PLC (ISGS)

Real-Time Data	Register Location in PLC Block	Range or Contents
Current Phase A	0	0...32000 A
Current Phase B	1	0...32000 A
Current Phase C	2	0...32000 A
Current Neutral	3	0...32000 A
Current Demand Phase A	4	0...32000 A
Current Demand Phase B	5	0...32000 A
Current Demand Phase C	6	0...32000 A
Voltage L-N Phase A	7–8	0...9999999 V
Voltage L-N Phase B	9–10	0...9999999 V
Voltage L-N Phase C	11–12	0...9999999 V
Voltage L-L Phase AB	13–14	0...9999999 V
Voltage L-L Phase BC	15–16	0...9999999 V
Voltage L-L Phase CA	17–18	0...9999999 V
Kilowatts	19–20	0...1000000000 kW
Kilowatt Demand	21–22	0...1000000000 kW
Kilowatt Hours (Total)	23–24	0...1000000000 kWH
Kilovolt-Amperes Reactive	25–26	0...1000000000 kVAR
Power Factor	27	-100...100
Frequency	28	0...32000, 0.1 Hz
Input/Output Status Note: When bit numbers are specified, Bit 15 is the highest order bit in the PLC register.	29	**Bit** **Contents** 15 Input 4 (BI4) Status 14 Input 3 (BI3) Status 13 Input 2 (BI2) Status 12 Input 1 (BI1) Status 11 Breaker Pos Error 10 Trip Source Impedance 9 Trip Solenoid Status 8 Breaker Pos (1 = Open) 7 Output 2 (BO2) Status 6 Output 1 (BO1) Status 5 Trip 3 Status 4 Trip 2 Status 3 Trip 1 Status 2 Relay Trip LED 1 Device in Pickup 0 Relay Fail Asserted
Breaker Operations	30	0...65535 Operations Reserved
Reserved	31–35	For Future Expansion

Device Command Data Retrieved From PLC (ISGS Switchgear)

First Command Word (Command Word)	Second Command Word (Data or Value)
0 = No Command to Perform	Unused for Command 0
1 = Clear Min/Max Log	Unused for Command 1
2 = Reset Kilowatt and Kilovolt-Amperes Reactive Hours	Unused for Command 2
3 = Assert Comm Event[1]	Comm Event to Assert (1–5)
4 = Release Comm Event[1]	Comm Event to Release (1–5)
5 = Reset Local Targets	Unused for Command 5
6 = Reset Breaker Operation	Unused for Command 6
7 = Reset Interrupted Current	Unused for Command 7

1. Communications events can be programmed on the ISGS unit to trip or close the circuit breaker, operate an output contact, or activate a binary input. Refer to the *ISGS Operator's Manual* (SGIM-8158A) for information on programming communications events.

C.10 Device Type: Sentron SB Energy Comm Trip Unit

Real-Time Device Data Stored in PLC (Energy/Comm)

Real-Time Data	Register Location in PLC Block	Range or Contents
Current Phase A	0	0...65535 A
Current Phase B	1	0...65535 A
Current Phase C	2	0...65535 A
Current Ground	3	0...65535 A
Voltage L-N Phase A	4	0...65535 V
Voltage L-N Phase B	5	0...65535 V
Voltage L-N Phase C	6	0...65535 V
Voltage L-L Phase AB	7	0...65535 V
Voltage L-L Phase BC	8	0...65535 V
Voltage L-L Phase CA	9	0...65535 V
Instantaneous Watts	10–11	0...4294967293 W
Instantaneous Watts Units	12	0 = Watts, 1 = kW, 2 = mW
Instantaneous Watts Direction	13	0 = Reverse, 1 = Forward
Instantaneous Volts-Amps Reactive	14–15	0...4294967293 VAR
Instantaneous Volts-Amps Reactive Units	16	0 = VAR, 1 = kVAR, 2 = mVAR
Instantaneous Volts-Amps Reactive Direction	17	0 = Reverse, 1 = Forward
Instantaneous Volts-Amps	18–19	0...4294967293 VA
Instantaneous Volts-Amps Units	20	0 = VA, 1 = kVA, 2 = mVA
Amps Demand	21	0...65535 A rms
Watts Demand	22–23	0...4294967293 W
Watts Demand	24	0 = Watts, 1 = kW, 2 = mW
Watts Demand Direction	25	0 = Reverse, 1 = Forward
Forward Watt Hours	26–27	0...4294967293 W
Forward Watt Hours Units	28	0 = Watts Hrs, 1 = kWH, 2 = mWH
Reverse Watt Hours	29–30	0...4294967293 W
Reverse Watt Hours Units	31	0 = Watts Hrs, 1 = kWH, 2 = mWH
Forward Volts-Amps Reactive Hours	32–33	0...4294967293
Forward Volts-Amps Reactive Hours Units	34	0 = VAR Hrs, 1 = kVARH, 2 = mVARH
Reverse Volts-Amps Reactive Hours	35–36	0...4294967293 VAR
Reverse VAR Hours Units	37	0 = VAR Hrs, 1 = kVARH, 2 = mVARH
Power Factor Phase A	38	0...100, 0.01%
PF Phase A Direction	39	0 = Lead, 1 = Lag
Power Factor Phase B	40	0...100, 0.01%
PF Phase B Direction	41	0 = Lead, 1 = Lag
Power Factor Phase C	42	0...100, 0.01%
PF Phase C Direction	43	0 = Lead, 1 = Lag
Frequency	44	400...700, 0.1 Hz
Breaker Position	45	0 = Open, 1 = Closed

Real-Time Device Data Stored in PLC (Energy/Comm) (Continued)

Real-Time Data	Register Location in PLC Block	Range or Contents
Alarm Function Status Note: When bit numbers are specified, Bit 15 is the highest order bit in the PLC register.	46	**Bit** **Contents** 15–10 Unused 9 Harmonic Distortion Alarm 8 Under PF Lag Alarm 7 Over PF Lead Alarm 6 Over kVAR Alarm 5 Over kVA Alarm 4 Over kW Demand Alarm 3 Over kW Alarm 2 Over Amp Demand Alarm 1 Grnd Over Amp Alarm 0 Over Amp Alarm
Protective Relay Status	47	**Bit** **Contents** 15–8 Unused 7 Under Frequency Alarm 6 Over Frequency Alarm 5 Over Reverse kW Alarm 4 Overvoltage Alarm 3 Voltage Unbalanced Alarm 2 Undervoltage Alarm 1 Current Unbalanced Alarm 0 Neutral Over Amp Alarm
Event Counter	48	0...65535
System Error Flag	49	0 = No System Errors 1 = EEPROM Write Error 2 = Status Update Error 3 = Clear Trip Log Error 4 = Trip Log Entry Error 5 = Breaker Test Error 6 = Trip Error
THD Phase A	50	0-100
THD Phase B	51	0-100
THD Phase C	52	0-100
THD Neutral	53	0-100

Device Command Data Retrieved From PLC (Energy/Comm)

First Command Word (Command Word)	Second Command Word (Data or Value)
0 = No Command to Perform	Unused for Command 0
1 = Reset All Demand Values	Unused for Command 1
2 = Reset All Hour Counters	Unused for Command 2
3 = Close Breaker	Unused for Command 3
4 = Open Breaker	Unused for Command 4

C.11 Device Type: S7-I/O

Real-Time Device Data Stored in PLC (S7-I/O)

Function	Register Location in PLC Block	Range or Contents
Inputs 1–16	0	Bits 0–15:
Inputs 17–32	1	Bits 0–15:
Inputs 18–48	2	Bits 0–15:
Inputs 49–64	3	Bits 0–15:
Outputs 1–16	4	Bits 0–15:
Outputs 17–32	5	Bits 0–15:
Outputs 18–48	6	Bits 0–15:
Outputs 49–64	7	Bits 0–15:
Event Counter 1	8	I0.0 Event Counter
Event Counter 2	9	I0.1 Event Counter
Event Counter 3	10	I0.2 Event Counter
Event Counter 4	11	I0.3 Event Counter
Event Counter 5	12	I0.4 Event Counter
Event Counter 6	13	I0.5 Event Counter
Event Counter 7	14	I0.6 Event Counter
Event Counter 8	15	I0.7 Event Counter
Event Counter (Total)	16	Total Event Counter
Reserved	17–21	For Future Expansion

Device Command Data Retrieved From PLC (S7-I/O)

First Command Word (Command Word)	Second Command Word (Data or Value)
0 = No Command to Perform	Unused for Command 0
1 = Clear Event Counter (s)	**Event Counter to Clear** 1 = Event Counter 1 2 = Event Counter 2 3 = Event Counter 3 4 = Event Counter 4 5 = Event Counter 5 6 = Event Counter 6 7 = Event Counter 7 8 = Event Counter 8 255 = All Event Counters
2 = Turn Output On	Output Number (1–64)
3 = Turn Output Off	Output Number (1–64)

C12 Device Type: 7SA511

Real-Time Device Data Stored in PLC (7SA511)

Function	Register Location in PLC Block	Range or Contents
Current Phase A (I_{L1})	0	%
Current Phase B (I_{L2})	1	%
Current Phase C (I_{L3})	2	%
Voltage L-N Phase A ($U_{L1}E$)	3	%
Voltage L-N Phase B ($U_{L2}E$)	4	%
Voltage L-N Phase C ($U_{L2}E$)	5	%
Watts Three-phase (Pa)	6	%
VAR Three-phase (Pr)	7	%
Frequency (f)	8	%
Voltage L-L Phase AB (U_{L12})	9	%
Voltage L-L Phase BC (U_{L23})	10	%
Voltage L-L Phase CA (U_{L31})	11	%
I_{ea}	12	mA
I_{er}	13	mA
General Status Word 1[1]	14	**Bit** **Contents** 15 Setting group C is active (Valid) 14 Setting group C is active (Status) 13 Setting group B is active (Valid) 12 Setting group B is active (Status) 11 Setting group A is active (Valid) 10 Setting group A is active (Status) 9 Device operative/healthy (Valid) 8 Device operative/healthy (Status) 7 >User defined annunciation 4 (Valid) 6 >User defined annunciation 4 (Status) 5 >User defined annunciation 3 (Valid) 4 >User defined annunciation 3 (Status) 3 >User defined annunciation 2 (Valid) 2 >User defined annunciation 2 (Status) 1 >User defined annunciation 1 (Valid) 0 >User defined annunciation 1 (Status)
General Status Word 2[1]	15	**Bit** **Contents** 15 Earth fault (isol./comp.) reverse dir (Valid) 14 Earth fault (isol./comp.) reverse dir (Status) 13 Earth fault (isol./comp.) forward dir (Valid) 12 Earth fault (isol./comp.) forward dir (Status) 11 >U Line side VT MCB tripped (Valid) 10 >U Line side VT MCB tripped (Status) 9 Failure: Phase sequence supervision (Valid) 8 Failure: Phase sequence supervision (Status) 7 Measured value supervision of voltages (Valid) 6 Measured value supervision of voltages (Status) 5 Measured value supervision of currents (Valid) 4 Measured value supervision of currents (Status) 3 General internal failure of device (Valid) 2 General internal failure of device (Status) 1 Setting group D is active (Valid) 0 Setting group D is active (Status)

Real-Time Device Data Stored in PLC (7SA511) (Continued)

Function	Register Location in PLC Block	Range or Contents
General Status Word 3[1]	16	**Bit** **Contents** 6–15 Not used 5 Dist. teleprotection: Carrier faulty (Valid) 4 Dist. teleprotection: Carrier faulty (Status) 3 AR: Auto-reclose is not ready (Valid) 2 AR: Auto-reclose is not ready (Status) 1 Emergency O/C protection is running (Valid) 0 Emergency O/C protection is running (Status)
Number of last fault	17	0…32767, 0 = no faults
Fault Date/Time (ms)	18	0…59999 (ms)
Fault Date/Time (h/m)	19	High byte: HH (0…23), Low byte: MM (0…59)
Fault Date/Time (m/d)	20	High byte: MM (1…12); Low byte: DD (1…31)
Fault Date/Time (y)	21	Year: YY (00…99)
Interrupted current: Phase L1 (I/I_n)	22	ms since fault (-1 = no occurrence)
Interrupted current: Phase L1 (I/I_n)	23	Low word
Interrupted current: Phase L1 (I/I_n)	24	High word
Interrupted current: Phase L2 (I/I_n)	25	ms since fault (-1 = no occurrence)
Interrupted current: Phase L2 (I/I_n)	26	Low word
Interrupted current: Phase L2 (I/I_n)	27	High word
Interrupted current: Phase L3 (I/I_n)	28	ms since fault (-1 = no occurrence)
Interrupted current: Phase L3 (I/I_n)	29	Low word
Interrupted current: Phase L3 (I/I_n)	30	High word
Fault Resistance, Ohm Prim.	31	ms since fault (-1 = no fault)
Fault Resistance, Ohm Prim.	32	Low word
Fault Resistance, Ohm Prim.	33	High word
Fault Reactance, Ohm Prim.	34	ms since fault (-1 = no fault)
Fault Reactance, Ohm Prim.	35	Low word
Fault Reactance, Ohm Prim.	36	High word
Fault Resistance, Ohm Sec.	37	ms since fault (-1 = no fault)
Fault Resistance, Ohm Sec.	38	Low word
Fault Resistance, Ohm Sec.	39	High word
Fault Reactance, Ohm Sec.	40	ms since fault (-1 = no fault)
Fault Reactance, Ohm Sec.	41	Low word
Fault Reactance, Ohm Sec.	42	High word
Distance to fault in km	43	ms since fault (-1 = no fault)
Distance to fault in km	44	Low word
Distance to fault in km	45	High word
Distance to fault in %	46	ms since fault (-1 = no fault)
Distance to fault in %	47	Low word
Distance to fault in %	48	High word

Real-Time Device Data Stored in PLC (7SA511) (Continued)

Function	Register Location in PLC Block	Range or Contents
Fault in the power system	49	ms since fault (-1 = no fault)
General Trip for Fault in Forward Direction	50	ms since fault (-1 = no occurrence)
General Trip for Fault in Reverse Direction	51	ms since fault (-1 = no occurrence)
Trip by earth fault det. (isol./comp.)	52	ms since fault (-1 = no occurrence)
Trip by earth fault protection	53	ms since fault (-1 = no occurrence)
Carrier Transmission for dir. Comp. E/F	54	ms since fault (-1 = no occurrence)
Transient Block. Of E/F protection	55	ms since fault (-1 = no occurrence)
Trip by thermal overload protection	56	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L1 only	57	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L1E	58	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L2 only	59	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L2E	60	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L12	61	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L12E	62	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L3 only	63	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L3E	64	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L13	65	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L13E	66	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L23	67	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L23E	68	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L123	69	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L123E	70	ms since fault (-1 = no occurrence)
Emerg. O/C protection: General Trip	71	ms since fault (-1 = no occurrence)
AR: Close command from auto-reclose	72	ms since fault (-1 = no occurrence)
Dist.: General fault detection	73	ms since fault (-1 = no occurrence)
Dist.: Fault detection only phase L1	74	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L1,E	75	ms since fault (-1 = no occurrence)

Real-Time Device Data Stored in PLC (7SA511) (Continued)

Function	Register Location in PLC Block	Range or Contents
Dist.: Fault detection only phase L2	76	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L2,E	77	ms since fault (-1 = no occurrence)
Dist.: Fault detection only phase L1,2	78	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L1,2,E	79	ms since fault (-1 = no occurrence)
Dist.: Fault detection only phase L3	80	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L3,E	81	ms since fault (-1 = no occurrence)
Dist.: Fault detection only phase L1,3	82	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L1,3,E	83	ms since fault (-1 = no occurrence)
Dist.: Fault detection only phase L2,3	84	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L2,3,E	85	ms since fault (-1 = no occurrence)
Dist.: Fault detection only phase L1,2,3	86	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L1,2,3,E	87	ms since fault (-1 = no occurrence)
Dist.: Fault det. In forward direction	88	ms since fault (-1 = no occurrence)
Dist.: Fault det. In reverse direction	89	ms since fault (-1 = no occurrence)
Dist.: Time T1 (Zone Z1) expired	90	ms since fault (-1 = no occurrence)
Dist.: Time T2 (Zone Z2) expired	91	ms since fault (-1 = no occurrence)
Dist.: Time T3 (Zone Z3) expired	92	ms since fault (-1 = no occurrence)
Dist.: Time T4 (direct. zone) expired	93	ms since fault (-1 = no occurrence)
Dist.: Time T5 (non-direct. zone) expired	94	ms since fault (-1 = no occurrence)
Dist.: Time T1B (Zone Z1B) expired	95	ms since fault (-1 = no occurrence)
Dist.: Time T1L (Zone Z1L) expired	96	ms since fault (-1 = no occurrence)
Distance Protection: General Trip	97	ms since fault (-1 = no occurrence)
Dist. Teleprotection: Carrier reception	98	ms since fault (-1 = no occurrence)
Dist. Teleprotection: Carrier send	99	ms since fault (-1 = no occurrence)
POTT Teleprotection: Tran-sient block	100	ms since fault (-1 = no occurrence)
Ext. trip via binary input: Trip	101	ms since fault (-1 = no occurrence)

Real-Time Device Data Stored in PLC (7SA511) (Continued)

Function	Register Location in PLC Block	Range or Contents
Ext. trip via binary input: 1pole L1	102	ms since fault (-1 = no occurrence)
Ext. trip via binary input: 1pole L2	103	ms since fault (-1 = no occurrence)
Ext. trip via binary input: 1pole L3	104	ms since fault (-1 = no occurrence)
Ext. trip via binary input: 3pole	105	ms since fault (-1 = no occurrence)
Ext. trip via binary input: Without AR	106	ms since fault (-1 = no occurrence)
Reserved	107–110	For future expansion

1. Status information for each parameter is transmitted in two bits. The status bit indicates status (true = 1, false = 0) for the parameter and the valid bit indicates that the device has successfully updated the value in the status bit (true = 1, false = 0).

Device Command Data Retrieved From PLC (7SA511)

First Command Word (Command Word)	Additional Command Words (Data or Value)
0 = No command	Unused
1 = Time Sync	2nd Word: Time [ms] - (0-59999) 3rd Word: Time [h/m] - high byte: HH (1-24), low byte: MM (0-59) 4th Word: Date [m/d] - high byte: MM (1-12), low byte: DD (1-31) 5th Word: Date [y] - YY (00-99)
2 = Reset LEDs	Unused
3 = Activate Parameter Set A	Unused
4 = Activate Parameter Set B	Unused
5 = Activate Parameter Set C	Unused
6 = Activate Parameter Set D	Unused
10 = General Command	2nd Word: [Typ] in high byte, [Inf] in low byte

C.13 Device Type: 7SA513

Real-Time Device Data Stored in PLC (7SA513)

Function	Register Location in PLC Block	Range or Contents
Current Phase A (I_{L1})	0	%
Current Phase B (I_{L2})	1	%
Current Phase C (I_{L3})	2	%
Voltage L-N Phase A ($U_{L1}E$)	3	%
Voltage L-N Phase B ($U_{L2}E$)	4	%
Voltage L-N Phase C ($U_{L2}E$)	5	%
Watts Three-phase (Pa)	6	%
VAR Three-phase (Pr)	7	%
Frequency (f)	8	%
Voltage L-L Phase AB (U_{L12})	9	%
Voltage L-L Phase BC (U_{L23})	10	%
Voltage L-L Phase CA (U_{L31})	11	%
I_{ea}	12	mA
I_{er}	13	mA
General Status Word 1[1]	14	**Bit** **Contents** 15 Setting group C is active (Valid) 14 Setting group C is active (Status) 13 Setting group B is active (Valid) 12 Setting group B is active (Status) 11 Setting group A is active (Valid) 10 Setting group A is active (Status) 9 Device operative/healthy (Valid) 8 Device operative/healthy (Status) 7 >User defined annunciation 4 (Valid) 6 >User defined annunciation 4 (Status) 5 >User defined annunciation 3 (Valid) 4 >User defined annunciation 3 (Status) 3 >User defined annunciation 2 (Valid) 2 >User defined annunciation 2 (Status) 1 >User defined annunciation 1 (Valid) 0 >User defined annunciation 1 (Status)
General Status Word 2[1]	15	**Bit** **Contents** 15 >U Line side VT MCB tripped (Valid) 14 >U Line side VT MCB tripped (Status) 13 Failure: Phase sequence supervision (Valid) 12 Failure: Phase sequence supervision (Status) 11 Fuse Failure Monitor Operated (>10s) (Valid) 10 Fuse Failure Monitor Operated (>10s) (Status) 9 Measured value supervision of voltages (Valid) 8 Measured value supervision of voltages (Status) 7 Measured value supervision of currents (Valid) 6 Measured value supervision of currents (Status) 5 Supervision Trip Circuit (Valid) 4 Supervision Trip Circuit (Status) 3 General internal failure of device (Valid) 2 General internal failure of device (Status) 1 Setting group D is active (Valid) 0 Setting group D is active (Status)

Real-Time Device Data Stored in PLC (7SA513) (Continued)

Function	Register Location in PLC Block	Range or Contents
General Status Word 3[1]	16	**Bit** **Contents** 15 AR: Auto-reclose is blocked (Valid) 14 AR: Auto-reclose is blocked (Status) 13 Back-up Overcurrent prot. Is active (Valid) 12 Back-up Overcurrent prot. Is active (Status) 11 Emergency O/C protection is active (Valid) 10 Emergency O/C protection is active (Status) 9 Emergency O/C protection is blocked (Valid) 8 Emergency O/C protection is blocked (Status) 7 Breaker failure protection is active (Valid) 6 Breaker failure protection is active (Status) 5 Earth fault protection is active (Valid) 4 Earth fault protection is active (Status) 3 Earth fault (isol./comp.) reverse dir. (Valid) 2 Earth fault (isol./comp.) reverse dir. (Status) 1 Earth fault (isol./comp.) forward dir. (Valid) 0 Earth fault (isol./comp.) forward dir. (Status)
General Status Word 4[1]	17	**Bit** **Contents** 15 Dist. teleprotection: Carrier faulty (Valid) 14 Dist. teleprotection: Carrier faulty (Status) 13 Distance Protection is active (Valid) 12 Distance Protection is active (Status) 11 Distance Protection is blocked (Valid) 10 Distance Protection is blocked (Status) 9 Synchro-Check function Faulty (Valid) 8 Synchro-Check function Faulty (Status) 7 Synchro-Check function is blocked (Valid) 6 Synchro-Check function is blocked (Status) 5 AR: Circuit Breaker not Ready (Valid) 4 AR: Circuit Breaker not Ready (Status) 3 AR: Auto-reclose is dynamically blocked (Valid) 2 AR: Auto-reclose is dynamically blocked (Status) 1 AR: Auto-reclose is not ready (Valid) 0 AR: Auto-reclose is not ready (Status)
General Status Word 5[1]	18	**Bit** **Contents** 12–15 Not Used 11 Overvoltage protection active (Valid) 10 Overvoltage protection active (Status) 9 Switch-onto-fault is active (Valid) 8 Switch-onto-fault is active (Status) 7 Switch-onto-fault is blocked (Valid) 6 Switch-onto-fault is blocked (Status) 5 Weak infeed function is active (Valid) 4 Weak infeed function is active (Status) 3 Weak infeed function is blocked (Valid) 2 Weak infeed function is blocked (Status) 1 Power Swing Detection (Valid) 0 Power Swing Detection (Status)
Number of Last Fault	19	0…32767, 0=no faults
Fault Date/Time (ms)	20	0…59999 (ms)
Fault Date/Time (h/m)	21	High byte: HH (0…23), Low byte: MM (0…59)
Fault Date/Time (m/d)	22	High byte: MM (1…12); Low byte: DD (1…31)
Fault Date/Time (y)	23	Year: YY (00…99)
Interrupted current: Phase L1 (I/I_n)	24	ms since fault (-1 = no occurrence)
Interrupted current: Phase L1 (I/I_n)	25	Low word
Interrupted current: Phase L1 (I/I_n)	26	High word

Real-Time Device Data Stored in PLC (7SA513) (Continued)

Function	Register Location in PLC Block	Range or Contents
Interrupted current: Phase L2 (I/I_n)	27	ms since fault (-1 = no occurrence)
Interrupted current: Phase L2 (I/I_n)	28	Low word
Interrupted current: Phase L2 (I/I_n)	29	High word
Interrupted current: Phase L3 (I/I_n)	30	ms since fault (-1 = no occurrence)
Interrupted current: Phase L3 (I/I_n)	31	Low word
Interrupted current: Phase L3 (I/I_n)	32	High word
Fault Resistance, Ohm Primary	33	ms since fault (-1 = no fault)
Fault Resistance, Ohm Primary	34	Low word
Fault Resistance, Ohm Primary	35	High word
Fault Reactance, Ohm Primary	36	ms since fault (-1 = no fault)
Fault Reactance, Ohm Primary	37	Low word
Fault Reactance, Ohm Primary	38	High word
Fault Resistance, Ohm Secendary	39	ms since fault (-1 = no fault)
Fault Resistance, Ohm Secendary	40	Low word
Fault Resistance, Ohm Secendary	41	High word
Fault Reactance, Ohm Secendary	42	ms since fault (-1 = no fault)
Fault Reactance, Ohm Secendary	43	Low word
Fault Reactance, Ohm Secendary	44	High word
Distance to fault in km	45	ms since fault (-1 = no fault)
Distance to fault in km	46	Low word
Distance to fault in km	47	High word
Distance to fault in %	48	ms since fault (-1 = no fault)
Distance to fault in %	49	Low word
Distance to fault in %	50	High word
Fault in the power system	51	ms since fault (-1 = no fault)
General Trip of Device	52	ms since fault (-1 = no occurrence)
General Trip for Fault in Forward Direction	53	ms since fault (-1 = no occurrence)
General Trip for Fault in Reverse Direction	54	ms since fault (-1 = no occurrence)
Trip by earth fault det. (isol./comp.)	55	ms since fault (-1 = no occurrence)
Trip by earth fault protection	56	ms since fault (-1 = no occurrence)
Carrier Transmission for dir. Comp. E/F	57	ms since fault (-1 = no occurrence)
Transient Block. Of E/F protection	58	ms since fault (-1 = no occurrence)

Real-Time Device Data Stored in PLC (7SA513) (Continued)

Function	Register Location in PLC Block	Range or Contents
Trip by Breaker Failure Protection	59	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L1 only	60	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L1E	61	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L2 only	62	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L2E	63	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L12	64	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L12E	65	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L3 only	66	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L3E	67	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L13	68	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L13E	69	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L23	70	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L23E	71	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L123	72	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L123E	73	ms since fault (-1 = no occurrence)
Emerg. O/C protection: General Trip	74	ms since fault (-1 = no occurrence)
AR: Close command from auto-reclose	75	ms since fault (-1 = no occurrence)
AR: Definitive Trip	76	ms since fault (-1 = no occurrence)
Dist.: Fault detection only phase L1	77	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L1,E	78	ms since fault (-1 = no occurrence)
Dist.: Fault detection only phase L2	79	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L2,E	80	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L1,2	81	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L1,2,E	82	ms since fault (-1 = no occurrence)
Dist.: Fault detection only phase L3	83	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L3,E	84	ms since fault (-1 = no occurrence)

Real-Time Device Data Stored in PLC (7SA513) (Continued)

Function	Register Location in PLC Block	Range or Contents
Dist.: Fault detection phase L1,3	85	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L1,3,E	86	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L2,3	87	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L2,3,E	88	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L1,2,3	89	ms since fault (-1 = no occurrence)
Dist.: Fault detection phase L1,2,3,E	90	ms since fault (-1 = no occurrence)
Dist.: Fault det. In forward direction	91	ms since fault (-1 = no occurrence)
Dist.: Fault det. In reverse direction	92	ms since fault (-1 = no occurrence)
Dist.: Time T1 (Zone Z1) expired	93	ms since fault (-1 = no occurrence)
Dist.: Time T2 (Zone Z2) expired	94	ms since fault (-1 = no occurrence)
Dist.: Time T3 (Zone Z3) expired	95	ms since fault (-1 = no occurrence)
Dist.: Time T4 (direct. zone) expired	96	ms since fault (-1 = no occurrence)
Dist.: Time T5 (non-direct. zone) expired	97	ms since fault (-1 = no occurrence)
Dist.: Time T1B (Zone Z1B) expired	98	ms since fault (-1 = no occurrence)
Dist.: Time T1L (Zone Z1L) expired	99	ms since fault (-1 = no occurrence)
Distance Protection: General Trip	100	ms since fault (-1 = no occurrence)
Dist. Teleprotection: Carrier reception	101	ms since fault (-1 = no occurrence)
Dist. Teleprotection: Carrier send	102	ms since fault (-1 = no occurrence)
POTT teleprotection: Transient block	103	ms since fault (-1 = no occurrence)
Weak Infeed: General Trip	104	ms since fault (-1 = no occurrence)
Switch-onto-fault: Fault Detection L1	105	ms since fault (-1 = no occurrence)
Switch-onto-fault: Fault Detection L2	106	ms since fault (-1 = no occurrence)
Switch-onto-fault: Fault Detection L3	107	ms since fault (-1 = no occurrence)
Switch-onto-fault: Trip 3pole	108	ms since fault (-1 = no occurrence)
Overvoltage Trip: Stage U>	109	ms since fault (-1 = no occurrence)
Overvoltage Trip: Stage U>>	110	ms since fault (-1 = no occurrence)
Ext. trip via binary input: Trip	111	ms since fault (-1 = no occurrence)
Ext. trip via binary input: 1pole L1	112	ms since fault (-1 = no occurrence)

Real-Time Device Data Stored in PLC (7SA513) (Continued)

Function	Register Location in PLC Block	Range or Contents
Ext. trip via binary input: 1pole L2	113	ms since fault (-1 = no occurrence)
Ext. trip via binary input: 1pole L3	114	ms since fault (-1 = no occurrence)
Ext. trip via binary input: 3pole	115	ms since fault (-1 = no occurrence)
Ext. trip via binary input: Without AR	116	ms since fault (-1 = no occurrence)
Reserved	117–120	For future expansion

1 Status information for each parameter is transmitted in two bits. The status bit indicates status (true=1, false=0) for the parameter and the valid bit indicates that the device has successfully updated the value in the status bit (true=1, false=0).

Device Command Data Retrieved From PLC (7SA513)

First Command Word (Command Word)	Additional Command Words (Data or Value)
0 = No command	Unused
1 = Time Sync	2nd Word: Time [ms] - (0-59999) 3rd Word: Time [h/m] - high byte: HH (1-24), low byte: MM (0-59) 4th Word: Date [m/d] - high byte: MM (1-12), low byte: DD (1-31) 5th Word: Date [y] - YY (00-99)
2 = Reset LEDs	Unused
3 = Activate Parameter Set A	Unused
4 = Activate Parameter Set B	Unused
5 = Activate Parameter Set C	Unused
6 = Activate Parameter Set D	Unused
10 = General Command	2nd Word: [Typ] in high byte, [Inf] in low byte

C.14 Device Type: 7SD511

Real-Time Device Data Stored in PLC (7SD511)

Function	Register Location in PLC Block	Range or Contents
Operational Measurement: IL1a	0	%
Operational Measurement: IL2a	1	%
Operational Measurement: IL3a	2	%
Operational Measurement: Iea	3	%
Time Delay of Transmission	4	ms
General Status Word 1:[1]	5	**Bit** **Contents** 15 Parameter set C is active (Valid) 14 Parameter set C is active (Status) 13 Parameter set B is active (Valid) 12 Parameter set B is active (Status) 11 Parameter set A is active (Valid) 10 Parameter set A is active (Status) 9 Device operative/healthy (Valid) 8 Device operative/healthy (Status) 7 >User defined annunciation 4 (Valid) 6 >User defined annunciation 4 (Status) 5 >User defined annunciation 3 (Valid) 4 >User defined annunciation 3 (Status) 3 >User defined annunciation 2 (Valid) 2 >User defined annunciation 2 (Status) 1 >User defined annunciation 1 (Valid) 0 >User defined annunciation 1 (Status)
General Status Word 2:[1]	6	**Bit** **Contents** 15 Transfer Trip function is active (Valid) 14 Transfer Trip function is active (Status) 13 Current comparison protection is active (Valid) 12 Current comparison protection is active (Status) 11 Emergency O/C protection is active (Valid) 10 Emergency O/C protection is active (Status) 9 Thermal overload prot.: Current warning (Valid) 8 Thermal overload prot.: Current warning (Status) 7 Thermal overload protection is active (Valid) 6 Thermal overload protection is active (Status) 5 Measured value supervision of currents (Valid) 4 Measured value supervision of currents (Status) 3 General internal failure of device (Valid) 2 General internal failure of device (Status) 1 Parameter set D is active (Valid) 0 Parameter set D is active (Status)
General Status Word 3:[1]	7	**Bit** **Contents** 6–15 Not Used 5 External Trip is Active (Valid) 4 External Trip is Active (Status) 3 Total reception failure (Valid) 2 Total reception failure (Status) 1 CCP blocked by time deviation > 1ms (Valid) 0 CCP blocked by time deviation > 1ms (Status)
Number of Last Fault	8	0…32767, 0=no faults
Fault Date/Time (ms)	9	0…59999 (ms)
Fault Date/Time (h/m)	10	High byte: HH (0…23), Low byte: MM (0…59)
Fault Date/Time (m/d)	11	High byte: MM (1…12); Low byte: DD (1…31)
Fault Date/Time (y)	12	Year: YY (00…99)
Interrupted current: Phase L1 (I/I_n)	13	ms since fault (-1 = no occurrence)

Real-Time Device Data Stored in PLC (7SD511) (Continued)

Function	Register Location in PLC Block	Range or Contents
Interrupted current: Phase L1 (I/I_n)	14	Low word
Interrupted current: Phase L1 (I/I_n)	15	High word
Interrupted current: Phase L2 (I/I_n)	16	ms since fault (-1 = no occurrence)
Interrupted current: Phase L2 (I/I_n)	17	Low word
Interrupted current: Phase L2 (I/I_n)	18	High word
Interrupted current: Phase L3 (I/I_n)	19	ms since fault (-1 = no occurrence)
Interrupted current: Phase L3 (I/I_n)	20	Low word
Interrupted current: Phase L3 (I/I_n)	21	High word
Fault in the power system	22	ms since fault (-1 = no fault)
General Trip of Device	23	ms since fault (-1 = no occurrence)
General 1pole trip of device: Phase L1	24	ms since fault (-1 = no occurrence)
General 1pole trip of device: Phase L2	25	ms since fault (-1 = no occurrence)
General 1pole trip of device: Phase L3	26	ms since fault (-1 = no occurrence)
General 3pole trip of device	27	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L1 only	28	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L1E	29	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L2 only	30	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L2E	31	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L12	32	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L12E	33	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L3 only	34	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L3E	35	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L13	36	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L13E	37	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L23	38	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L23E	39	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L123	40	ms since fault (-1 = no occurrence)

Real-Time Device Data Stored in PLC (7SD511) (Continued)

Function	Register Location in PLC Block	Range or Contents
Emerg. O/C fault detection L123E	41	ms since fault (-1 = no occurrence)
Emerg. O/C protection: General Trip	42	ms since fault (-1 = no occurrence)
Emerg. O/C protection: Trip 1pole L1	43	ms since fault (-1 = no occurrence)
Emerg. O/C protection: Trip 1pole L2	44	ms since fault (-1 = no occurrence)
Emerg. O/C protection: Trip 1pole L3	45	ms since fault (-1 = no occurrence)
Emerg. O/C protection: Trip 3pole	46	ms since fault (-1 = no occurrence)
General Trip Signal of current compare prt.	47	ms since fault (-1 = no occurrence)
Trip L1 (1-pole) of current comp. prot.	48	ms since fault (-1 = no occurrence)
Trip L2 (1-pole) of current comp. prot.	49	ms since fault (-1 = no occurrence)
Trip L3 (1-pole) of current comp. prot.	50	ms since fault (-1 = no occurrence)
Trip 3-pole of current comparison prot.	51	ms since fault (-1 = no occurrence)
Reserved	52–55	For future expansion

1. Status information for each parameter is transmitted in two bits. The status bit indicates status (true=1, false=0) for the parameter and the valid bit indicates that the device has successfully updated the value in the status bit (true=1, false=0).

Device Command Data Retrieved From PLC (7SD511)

First Command Word (Command Word)	Additional Command Words (Data or Value)
0 = No command	Unused
1 = Time Sync	2nd Word: Time [ms] - (0-59999) 3rd Word: Time [h/m] - high byte: HH (1-24), low byte: MM (0-59) 4th Word: Date [m/d] - high byte: MM (1-12), low byte: DD (1-31) 5th Word: Date [y] - YY (00-99)
2 = Reset LEDs	Unused
3 = Activate Parameter Set A	Unused
4 = Activate Parameter Set B	Unused
5 = Activate Parameter Set C	Unused
6 = Activate Parameter Set D	Unused
10 = General Command	2nd Word: [Typ] in high byte, [Inf] in low byte

C15 Device Type: 7SD512

Real-Time Device Data Stored in PLC (7SD512)

Function	Register Location in PLC Block	Range or Contents
Operational Measurement: IL1a	0	%
Operational Measurement: IL2a	1	%
Operational Measurement: IL3a	2	%
Operational Measurement: Iea	3	%
Time Delay of Transmission	4	ms
General Status Word 1:[1]	5	**Bit** **Contents** 15 Parameter set C is active (Valid) 14 Parameter set C is active (Status) 13 Parameter set B is active (Valid) 12 Parameter set B is active (Status) 11 Parameter set A is active (Valid) 10 Parameter set A is active (Status) 9 Device operative/healthy (Valid) 8 Device operative/healthy (Status) 7 >User defined annunciation 4 (Valid) 6 >User defined annunciation 4 (Status) 5 >User defined annunciation 3 (Valid) 4 >User defined annunciation 3 (Status) 3 >User defined annunciation 2 (Valid) 2 >User defined annunciation 2 (Status) 1 >User defined annunciation 1 (Valid) 0 >User defined annunciation 1 (Status)
General Status Word 2:[1]	6	**Bit** **Contents** 15 AR: Auto-reclose is not ready (Valid) 14 AR: Auto-reclose is not ready (Status) 13 AR: Auto-reclose is blocked (Valid) 12 AR: Auto-reclose is blocked (Status) 11 Emergency O/C protection is active (Valid) 10 Emergency O/C protection is active (Status) 9 Thermal overload prot.: Current warning (Valid) 8 Thermal overload prot.: Current warning (Status) 7 Thermal overload protection is active (Valid) 6 Thermal overload protection is active (Status) 5 Measured value supervision of currents (Valid) 4 Measured value supervision of currents (Status) 3 General internal failure of device (Valid) 2 General internal failure of device (Status) 1 Parameter set D is active (Valid) 0 Parameter set D is active (Status)
General Status Word 3:[1]	7	**Bit** **Contents** 12–15 Not Used 11 External Trip is Active (Valid) 10 External Trip is Active (Status) 9 Total reception failure (Valid) 8 Total reception failure (Status) 7 CCP blocked by time deviation > 1ms (Valid) 6 CCP blocked by time deviation > 1ms (Status) 5 Transfer Trip function is active (Valid) 4 Transfer Trip function is active (Status) 3 Current comparison protection is active (Valid) 2 Current comparison protection is active (Status) 1 AR: Auto-reclose is dynamically blocked (Valid) 0 AR: Auto-reclose is dynamically blocked (Status)
Number of Last Fault	8	0…32767, 0 = no faults
Fault Date/Time (ms)	9	0…59999 (ms)

Real-Time Device Data Stored in PLC (7SD512) (Continued)

Function	Register Location in PLC Block	Range or Contents
Fault Date/Time (h/m)	10	High byte: HH (0…23), Low byte: MM (0…59)
Fault Date/Time (m/d)	11	High byte: MM (1…12); Low byte: DD (1…31)
Fault Date/Time (y)	12	Year: YY (00…99)
Interrupted current: Phase L1 (I/I_n)	13	ms since fault (-1 = no occurrence)
Interrupted current: Phase L1 (I/I_n)	14	Low word
Interrupted current: Phase L1 (I/I_n)	15	High word
Interrupted current: Phase L2 (I/I_n)	16	ms since fault (-1 = no occurrence)
Interrupted current: Phase L2 (I/I_n)	17	Low word
Interrupted current: Phase L2 (I/I_n)	18	High word
Interrupted current: Phase L3 (I/I_n)	19	ms since fault (-1 = no occurrence)
Interrupted current: Phase L3 (I/I_n)	20	Low word
Interrupted current: Phase L3 (I/I_n)	21	High word
Fault in the power system	22	ms since fault (-1 = no fault)
General Trip of Device	23	ms since fault (-1 = no occurrence)
General 1pole trip of device: Phase L1	24	ms since fault (-1 = no occurrence)
General 1pole trip of device: Phase L2	25	ms since fault (-1 = no occurrence)
General 1pole trip of device: Phase L3	26	ms since fault (-1 = no occurrence)
General 3pole trip of device	27	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L1 only	28	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L1E	29	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L2 only	30	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L2E	31	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L12	32	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L12E	33	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L3 only	34	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L3E	35	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L13	36	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L13E	37	ms since fault (-1 = no occurrence)

Real-Time Device Data Stored in PLC (7SD512) (Continued)

Function	Register Location in PLC Block	Range or Contents
Emerg. O/C fault detection L23	38	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L23E	39	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L123	40	ms since fault (-1 = no occurrence)
Emerg. O/C fault detection L123E	41	ms since fault (-1 = no occurrence)
Emerg. O/C protection: General Trip	42	ms since fault (-1 = no occurrence)
Emerg. O/C protection: Trip 1pole L1	43	ms since fault (-1 = no occurrence)
Emerg. O/C protection: Trip 1pole L2	44	ms since fault (-1 = no occurrence)
Emerg. O/C protection: Trip 1pole L3	45	ms since fault (-1 = no occurrence)
Emerg. O/C protection: Trip 3pole	46	ms since fault (-1 = no occurrence)
79-A/R CLOSE command	47	ms since fault (-1 = no occurrence)
General Trip Signal of current compare prt.	48	ms since fault (-1 = no occurrence)
Trip L1 (1-pole) of current comp. prot.	49	ms since fault (-1 = no occurrence)
Trip L2 (1-pole) of current comp. prot.	50	ms since fault (-1 = no occurrence)
Trip L3 (1-pole) of current comp. prot.	51	ms since fault (-1 = no occurrence)
Trip 3-pole of current comparison prot.	52	ms since fault (-1 = no occurrence)
Reserved	53–56	For future expansion

1. Status information for each parameter is transmitted in two bits. The status bit indicates status (true = 1, false = 0) for the parameter and the valid bit indicates that the device has successfully updated the value in the status bit (true = 1, false = 0).

Device Command Data Retrieved From PLC (7SD512)

First Command Word (Command Word)	Additional Command Words (Data or Value)
0 = No command	Unused
1 = Time Sync	2nd Word: Time [ms] - (0-59999) 3rd Word: Time [h/m] - high byte: HH (1-24), low byte: MM (0-59) 4th Word: Date [m/d] - high byte: MM (1-12), low byte: DD (1-31) 5th Word: Date [y] - YY (00-99)
2 = Reset LEDs	Unused
3 = Activate Parameter Set A	Unused
4 = Activate Parameter Set B	Unused
5 = Activate Parameter Set C	Unused
6 = Activate Parameter Set D	Unused
10 = General Command	2nd Word: [Typ] in high byte, [Inf] in low byte

C.16 Device Type: 7SJ511

Real-Time Device Data Stored in PLC (7SJ511)

Function	Register Location in PLC Block	Range or Contents
Phase A current (IL1)	0	%
Phase B current (IL2)	1	%
Phase C current (IL3)	2	%
Neutral current (IE)	3	%
PhA-N voltage (UL1E)	4	%
PhB-N voltage (UL2E)	5	%
PhC-N voltage (UL3E)	6	%
PhA to PhB voltage (UE)	7	%
Three phase Watt (Pa)	8	%
Three phase Var (Pr)	9	%
Volt-amperes (S)	10	%
Power factor cos(phi)	11	%
Frequency (f)	12	%
IEEwLSA	13	mA
IEEbLSA	14	mA
General Status Word 1: [1]	15	**Bit** **Contents** 15 Setting group C is active (Valid) 14 Setting group C is active (Status) 13 Setting group B is active (Valid) 12 Setting group B is active (Status) 11 Setting group A is active (Valid) 10 Setting group A is active (Status) 9 Relay is operational and protecting (Valid) 8 Relay is operational and protecting (Status) 7 >User defined event 4 (Valid) 6 >User defined event 4 (Status) 5 >User defined event 3 (Valid) 4 >User defined event 3 (Status) 3 >User defined event 2 (Valid) 2 >User defined event 2 (Status) 1 >User defined event 1 (Valid) 0 >User defined event 1 (Status)
General Status Word 2:[1]	16	**Bit** **Contents** 15 >51-BLOCK phase inverse time (Valid) 14 >51-BLOCK phase inverse time (Status) 13 >50-BLOCK phase instantaneous (Valid) 12 >50-BLOCK phase instantaneous (Status) 11 >50HS-BLOCK phase high-set (Valid) 10 >50HS-BLOCK phase high-set (Status) 9 Thermal overload prot.: Thermal warning (Valid) 8 Thermal overload prot.: Thermal warning (Status) 7 Thermal overload prot.: Current warning (Valid) 6 Thermal overload prot.: Current warning (Status) 5 Failure: Current supervision (Valid) 4 Failure: Current supervision (Status) 3 Error with a summary alarm (Valid) 2 Error with a summary alarm (Status) 1 Setting group D is active (Valid) 0 Setting group D is active (Status)

Real-Time Device Data Stored in PLC (7SJ511) (Continued)

Function	Register Location in PLC Block	Range or Contents
General Status Word 3:[1]	17	**Bit** **Contents** 14–15 Not Used 13 Non-dir. ground O/C prot. PICKUP (Valid) 12 Non-dir. ground O/C prot. PICKUP (Status) 11 Non-dir. phase C O/C prot. PICKUP (Valid) 10 Non-dir. phase C O/C prot. PICKUP (Status) 9 Non-dir. phase B O/C prot. PICKUP (Valid) 8 Non-dir. phase B O/C prot. PICKUP (Status) 7 Non-dir. phase A O/C prot. PICKUP (Valid) 6 Non-dir. phase A O/C prot. PICKUP (Status) 5 >51N-BLOCK ground inverse time (Valid) 4 >51N-BLOCK ground inverse time (Status) 3 >50N-BLOCK ground instantaneous (Valid) 2 >50N-BLOCK ground instantaneous (Status) 1 >50NHS-BLOCK ground high-set (Valid) 0 >50NHS-BLOCK ground high-set (Status)
Number of Last Fault	18	0…32767, 0 = no faults
Fault Date/Time (ms)	19	0…59999 (ms)
Fault Date/Time (h/m)	20	High byte: HH (0…23), Low byte: MM (0…59)
Fault Date/Time (m/d)	21	High byte: MM (1…12); Low byte: DD (1…31)
Fault Date/Time (y)	22	Year: YY (00…99)
Interrupted current: Phase L1 (I/I_n)	23	ms since fault (-1 = no occurrence)
Interrupted current: Phase L1 (I/I_n)	24	Low word
Interrupted current: Phase L1 (I/I_n)	25	High word
Interrupted current: Phase L2 (I/I_n)	26	ms since fault (-1 = no occurrence)
Interrupted current: Phase L2 (I/I_n)	27	Low word
Interrupted current: Phase L2 (I/I_n)	28	High word
Interrupted current: Phase L3 (I/I_n)	29	ms since fault (-1 = no occurrence)
Interrupted current: Phase L3 (I/I_n)	30	Low word
Interrupted current: Phase L3 (I/I_n)	31	High word
Fault in the power system	32	ms since fault (-1 = no fault)
General Trip of Device	33	ms since fault (-1 = no occurrence)
50BF-Breaker Fail TRIP	34	ms since fault (-1 = no occurrence)
Thermal overload protection trip	35	ms since fault (-1 = no occurrence)
O/C Fault Detection L1 only	36	ms since fault (-1 = no occurrence)
O/C Fault Detection L1-E	37	ms since fault (-1 = no occurrence)
O/C Fault Detection L2 only	38	ms since fault (-1 = no occurrence)
O/C Fault Detection L2-E	39	ms since fault (-1 = no occurrence)
O/C Fault Detection L1-L2	40	ms since fault (-1 = no occurrence)
O/C Fault Detection L1-L2-E	41	ms since fault (-1 = no occurrence)
O/C Fault Detection L3	42	ms since fault (-1 = no occurrence)
O/C Fault Detection L3-E	43	ms since fault (-1 = no occurrence)

Real-Time Device Data Stored in PLC (7SJ511) (Continued)

Function	Register Location in PLC Block	Range or Contents
O/C Fault Detection L1-L3	44	ms since fault (-1 = no occurrence)
O/C Fault Detection L1-L3-E	45	ms since fault (-1 = no occurrence)
O/C Fault Detection L2-L3	46	ms since fault (-1 = no occurrence)
O/C Fault Detection L2-L3-E	47	ms since fault (-1 = no occurrence)
O/C Fault Detection L1-L2-L3	48	ms since fault (-1 = no occurrence)
O/C Fault Detection L1-L2-L3-E	49	ms since fault (-1 = no occurrence)
O/C Fault Detection E only	50	ms since fault (-1 = no occurrence)
O/C General Trip Command	51	ms since fault (-1 = no occurrence)
50HS-Phase high-set element TRIP	52	ms since fault (-1 = no occurrence)
50-Phase inst. element TRIP	53	ms since fault (-1 = no occurrence)
51-Phase time element TRIP	54	ms since fault (-1 = no occurrence)
50NHS-Ground high-set element TRIP	55	ms since fault (-1 = no occurrence)
50N-Ground inst. element TRIP	56	ms since fault (-1 = no occurrence)
51N-Ground time element TRIP	57	ms since fault (-1 = no occurrence)
Reserved	58–61	For future expansion

1. Status information for each parameter is transmitted in two bits. The status bit indicates status (true = 1, false = 0) for the parameter and the valid bit indicates that the device has successfully updated the value in the status bit (true = 1, false = 0).

Device Command Data Retrieved From PLC (7SJ511)

First Command Word (Command Word)	Additional Command Words (Data or Value)
0 = No command	Unused
1 = Time Sync	2nd Word: Time [ms] - (0-59999) 3rd Word: Time [h/m] - high byte: HH (1-24), low byte: MM (0-59) 4th Word: Date [m/d] - high byte: MM (1-12), low byte: DD (1-31) 5th Word: Date [y] - YY (00-99)
2 = Reset LEDs	Unused
3 = Activate Parameter Set A	Unused
4 = Activate Parameter Set B	Unused
5 = Activate Parameter Set C	Unused
6 = Activate Parameter Set D	Unused
10 = General Command	2nd Word: [Typ] in high byte, [Inf] in low byte

C17 Device Type: 7SJ512

Real-Time Device Data Stored in PLC (7SJ512)

Function	Register Location in PLC Block	Range or Contents
Phase A current (IL1)	0	%
Phase B current (IL2)	1	%
Phase C current (IL3)	2	%
Neutral current (IE)	3	%
PhA-N voltage (UL1E)	4	%
PhB-N voltage (UL2E)	5	%
PhC-N voltage (UL3E)	6	%
PhA to PhB voltage (UE)	7	%
Three phase Watt (Pa)	8	%
Three phase Var (Pr)	9	%
Volt-amperes (S)	10	%
Power factor cos(phi)	11	%
Frequency (f)	12	%
General Status Word 1:[1]	13	**Bit** **Contents** 15 Setting group C is active (Valid) 14 Setting group C is active (Status) 13 Setting group B is active (Valid) 12 Setting group B is active (Status) 11 Setting group A is active (Valid) 10 Setting group A is active (Status) 9 Relay is operational and protecting (Valid) 8 Relay is operational and protecting (Status) 7 >User defined event 4 (Valid) 6 >User defined event 4 (Status) 5 >User defined event 3 (Valid) 4 >User defined event 3 (Status) 3 >User defined event 2 (Valid) 2 >User defined event 2 (Status) 1 >User defined event 1 (Valid) 0 >User defined event 1 (Status)
General Status Word 2:[1]	14	**Bit** **Contents** 15 50BF-Breaker failure prot. is ACTIVE (Valid) 14 50BF-Breaker failure prot. is ACTIVE (Status) 13 Circuit breaker status Error (Valid) 12 Circuit breaker status Error (Status) 11 Circuit breaker is closed (Valid) 10 Circuit breaker is closed (Status) 9 Circuit breaker is open (Valid) 8 Circuit breaker is open (Status) 7 Failure: Voltage supervision (Valid) 6 Failure: Voltage supervision (Status) 5 Failure: Current supervision (Valid) 4 Failure: Current supervision (Status) 3 Error with a summary alarm (Valid) 2 Error with a summary alarm (Status) 1 Setting group D is active (Valid) 0 Setting group D is active (Status)

Real-Time Device Data Stored in PLC (7SJ512) (Continued)

Function	Register Location in PLC Block	Range or Contents
General Status Word 3:[1]	15	**Bit** **Contents** 15 Non-dir. ground O/C prot. is ACTIVE (Valid) 14 Non-dir. ground O/C prot. is ACTIVE (Status) 13 Non-dir. phase O/C prot. is ACTIVE (Valid) 12 Non-dir. phase O/C prot. is ACTIVE (Status) 11 >51N-BLOCK ground inverse time (Valid) 10 >51N-BLOCK ground inverse time (Status) 9 >50N-BLOCK ground instantaneous (Valid) 8 >50N-BLOCK ground instantaneous (Status) 7 >50NHS-BLOCK ground high-set (Valid) 6 >50NHS-BLOCK ground high-set (Status) 5 >51-BLOCK phase inverse time (Valid) 4 >51-BLOCK phase inverse time (Status) 3 >50-BLOCK phase instantaneous (Valid) 2 >50-BLOCK phase instantaneous (Status) 1 >50HS-BLOCK phase high-set (Valid) 0 >50HS-BLOCK phase high-set (Status)
General Status Word 4:[1]	16	**Bit** **Contents** 15 >79-A/R coordination control (Valid) 14 >79-A/R coordination control (Status) 13 67N/67NT-Dir. ground prot. is ACTIVE (Valid) 12 67N/67NT-Dir. ground prot. is ACTIVE (Status) 11 67N/67NT-Dir. ground prot. switched OFF (Valid) 10 67N/67NT-Dir. ground prot. switched OFF (Status) 9 67/67T-Dir. phase prot. is ACTIVE (Valid) 8 67/67T-Dir. phase prot. is ACTIVE (Status) 7 67/67T-Dir. phase prot. switched OFF (Valid) 6 67/67T-Dir. phase prot. switched OFF (Status) 5 Cold-Load-Pickup settings EFFECTIVE (Valid) 4 Cold-Load-Pickup settings EFFECTIVE (Status) 3 Cold-Load-Pickup is ACTIVE (Valid) 2 Cold-Load-Pickup is ACTIVE (Status) 1 Cold-Load-Pickup switched OFF (Valid) 0 Cold-Load-Pickup switched OFF (Status)
General Status Word 5:[1]	17	**Bit** **Contents** 15 46-Negative seq. switched OFF (Valid) 14 46-Negative seq. switched OFF (Status) 13 Zone sequence coordination in PROGRESS (Valid) 12 Zone sequence coordination in PROGRESS (Status) 11 Zone sequence coordination switched ON (Valid) 10 Zone sequence coordination switched ON (Status) 9 79 -A/R cycle successful (Valid) 8 79 -A/R cycle successful (Status) 7 79 -A/R in LOCKOUT (Valid) 6 79 -A/R in LOCKOUT (Status) 5 79 -A/R is NOT READY (Valid) 4 79 -A/R is NOT READY (Status) 3 >79-Ext. initiation single phase seq. (Valid) 2 >79-Ext. initiation single phase seq. (Status) 1 >79-READY from external device for A/R (Valid) 0 >79-READY from external device for A/R (Status)

Real-Time Device Data Stored in PLC (7SJ512) (Continued)

Function	Register Location in PLC Block	Range or Contents
General Status Word 6:[1]	18	**Bit** **Contents** 14–15 Not Used 13 59-Overvoltage protection is ACTIVE (Valid) 12 59-Overvoltage protection is ACTIVE (Status) 11 59-Overvoltage protection switched OFF (Valid) 10 59-Overvoltage protection switched OFF (Status) 9 27-Undervoltage protection is ACTIVE (Valid) 8 27-Undervoltage protection is ACTIVE (Status) 7 27-Undervoltage prot. switched OFF (Valid) 6 27-Undervoltage prot. switched OFF (Status) 5 >27-2 BLOCK UV protection second step (Valid) 4 >27-2 BLOCK UV protection second step (Status) 3 >27-1 BLOCK UV protection first step (Valid) 2 >27-1 BLOCK UV protection first step (Status) 1 46-Negative seq. is ACTIVE (Valid) 0 46-Negative seq. is ACTIVE (Status)
Number of Last Fault	19	0…32767, 0 = no faults
Fault Date/Time (ms)	20	0…59999 (ms)
Fault Date/Time (h/m)	21	High byte: HH (0…23), Low byte: MM (0…59)
Fault Date/Time (m/d)	22	High byte: MM (1…12); Low byte: DD (1…31)
Fault Date/Time (y)	23	Year: YY (00…99)
Interrupted current: Phase L1 (I/I_n)	24	ms since fault (-1 = no occurrence)
Interrupted current: Phase L1 (I/I_n)	25	Low word
Interrupted current: Phase L1 (I/I_n)	26	High word
Interrupted current: Phase L2 (I/I_n)	27	ms since fault (-1 = no occurrence)
Interrupted current: Phase L2 (I/I_n)	28	Low word
Interrupted current: Phase L2 (I/I_n)	29	High word
Interrupted current: Phase L3 (I/I_n)	30	ms since fault (-1 = no occurrence)
Interrupted current: Phase L3 (I/I_n)	31	Low word
Interrupted current: Phase L3 (I/I_n)	32	High word
Flt Loc.: Secondary react. to fault	33	ms since fault (-1 = no fault)
Flt Loc.: Secondary react. to fault	34	Low word
Flt Loc.: Secondary react. to fault	35	High word
Fault in the power system	36	ms since fault (-1 = no fault)
General Trip of Device	37	ms since fault (-1 = no occurrence)
50BF-Breaker Fail TRIP	38	ms since fault (-1 = no occurrence)
O/C fault detection phase 1	39	ms since fault (-1 = no occurrence)
O/C fault detection phase 2	40	ms since fault (-1 = no occurrence)
O/C fault detection phase 3	41	ms since fault (-1 = no occurrence)
O/C fault detection earth	42	ms since fault (-1 = no occurrence)

Real-Time Device Data Stored in PLC (7SJ512) (Continued)

Function	Register Location in PLC Block	Range or Contents
50HS-Phase high-set element TRIP	43	ms since fault (-1 = no occurrence)
50-Phase inst. element TRIP	44	ms since fault (-1 = no occurrence)
51-Phase time element TRIP	45	ms since fault (-1 = no occurrence)
50NHS-Ground high-set element TRIP	46	ms since fault (-1 = no occurrence)
50N-Ground inst. element TRIP	47	ms since fault (-1 = no occurrence)
51N-Ground time element TRIP	48	ms since fault (-1 = no occurrence)
67-Dir. phase inst. element TRIP	49	ms since fault (-1 = no occurrence)
67T-Dir. phase time element TRIP	50	ms since fault (-1 = no occurrence)
67N-Dir. ground inst. element TRIP	51	ms since fault (-1 = no occurrence)
67NT-Dir. ground time element TRIP	52	ms since fault (-1 = no occurrence)
Dir. O/C protection PICKUP	53	ms since fault (-1 = no occurrence)
Dir. O/C protection TRIP	54	ms since fault (-1 = no occurrence)
79 -A/R cycle successful	55	ms since fault (-1 = no occurrence)
46-Negative seq. protection TRIP	56	ms since fault (-1 = no occurrence)
27-1 Undervoltage first step TRIP	57	ms since fault (-1 = no occurrence)
27-2 Undervoltage second step TRIP	59	ms since fault (-1 = no occurrence)
59-Overvoltage TRIP	59	ms since fault (-1 = no occurrence)
Reserved	60–63	For future expansion

1. Status information for each parameter is transmitted in two bits. The status bit indicates status (true = 1, false = 0) for the parameter and the valid bit indicates that the device has successfully updated the value in the status bit (true = 1, false = 0).

Device Command Data Retrieved From PLC (7SJ512)

First Command Word (Command Word)	Additional Command Words (Data or Value)
0 = No command	Unused
1 = Time Sync	2nd Word: Time [ms] - (0-59999) 3rd Word: Time [h/m] - high byte: HH (1-24), low byte: MM (0-59) 4th Word: Date [m/d] - high byte: MM (1-12), low byte: DD (1-31) 5th Word: Date [y] - YY (00-99)
2 = Reset LEDs	Unused
3 = Activate Parameter Set A	Unused
4 = Activate Parameter Set B	Unused
5 = Activate Parameter Set C	Unused
6 = Activate Parameter Set D	Unused
10 = General Command	2nd Word: [Typ] in high byte, [Inf] in low byte

C18 Device Type: 7SJ531

Real-Time Device Data Stored in PLC (7SJ531)

Function	Register Location in PLC Block	Range or Contents
Phase A current (IL1)	0	%
Phase B current (IL2)	1	%
Phase C current (IL3)	2	%
Neutral current (IE)	3	%
PhA-N voltage (UL1E)	4	%
PhB-N voltage (UL2E)	5	%
PhC-N voltage (UL3E)	6	%
PhA-PhB voltage (UL12)	7	%
PhB-PhC voltage (UL23)	8	%
PhC-PhA voltage (UL31)	9	%
Active Power (Pa)	10	%
Reactive Power (Pr)	11	%
Frequency (f)	12	%
IEEwLSA	13	%
IEEbLSA	14	%
Power Factor (cos phi)	15	%
General Status Word 1:[1]	16	**Bit** **Contents** 15 Error with a summary alarm (Valid) 14 Error with a summary alarm (Status) 13 Setting group B is active (Valid) 12 Setting group B is active (Status) 11 Setting group A is active (Valid) 10 Setting group A is active (Status) 9 Relay is operational and protecting (Valid) 8 Relay is operational and protecting (Status) 7 >User defined event 4 (Valid) 6 >User defined event 4 (Status) 5 >User defined event 3 (Valid) 4 >User defined event 3 (Status) 3 >User defined event 2 (Valid) 2 >User defined event 2 (Status) 1 >User defined event 1 (Valid) 0 >User defined event 1 (Status)
General Status Word 2:[1]	17	**Bit** **Contents** 15 IE setting exceeded (Valid) 14 IE setting exceeded (Status) 13 IL3 setting exceeded (Valid) 12 IL3 setting exceeded (Status) 11 IL2 setting exceeded (Valid) 10 IL2 setting exceeded (Status) 9 IL1 setting exceeded (Valid) 8 IL1 setting exceeded (Status) 7 Failure: Battery (Valid) 6 Failure: Battery (Status) 5 Failure: Voltage supervision (Valid) 4 Failure: Voltage supervision (Status) 3 Failure: Current supervision (Valid) 2 Failure: Current supervision (Status) 1 Supervision Trip Circuit (Valid) 0 Supervision Trip Circuit (Status)

Real-Time Device Data Stored in PLC (7SJ531) (Continued)

Function	Register Location in PLC Block	Range or Contents
General Status Word 3:[1]	18	**Bit** **Contents** 15 Non-dir. phase O/C prot. is ACTIVE (Valid) 14 Non-dir. phase O/C prot. is ACTIVE (Status) 13 Thermal overload prot.: Current warning (Valid) 12 Thermal overload prot.: Current warning (Status) 11 Thermal Overload Protection is ACTIVE (Valid) 10 Thermal Overload Protection is ACTIVE (Status) 9 50BF-Breaker failure prot. is ACTIVE (Valid) 8 50BF-Breaker failure prot. is ACTIVE (Status) 7 Active Power Exceeded (Valid) 6 Active Power Exceeded (Status) 5 Reactive Power Exceeded (Valid) 4 Reactive Power Exceeded (Status) 3 Power Factor Alarm (Valid) 2 Power Factor Alarm (Status) 1 IL< alarm (Valid) 0 IL< alarm (Status)
General Status Word 4:[1]	19	**Bit** **Contents** 15 Error DC pos Q0 (Valid) 14 Error DC pos Q0 (Status) 13 Error CB/DC pos (Valid) 12 Error CB/DC pos (Status) 11 79 -A/R in LOCKOUT (Valid) 10 79 -A/R in LOCKOUT (Status) 9 79 -A/R is NOT READY (Valid) 8 79 -A/R is NOT READY (Status) 7 79-A/R is BLOCKED (Valid) 6 79-A/R is BLOCKED (Status) 5 67N/67NT-Dir. ground prot. is ACTIVE (Valid) 4 67N/67NT-Dir. ground prot. is ACTIVE (Status) 3 67/67T-Dir. phase prot. is ACTIVE (Valid) 2 67/67T-Dir. phase prot. is ACTIVE (Status) 1 Non-dir. ground O/C prot. is ACTIVE (Valid) 0 Non-dir. ground O/C prot. is ACTIVE (Status)
General Status Word 5:[1]	20	**Bit** **Contents** 15 Error DC pos Q16 (Valid) 14 Error DC pos Q16 (Status) 13 Error DC pos Q15 (Valid) 12 Error DC pos Q15 (Status) 11 Error DC pos Q10 (Valid) 10 Error DC pos Q10 (Status) 9 Error DC pos Q8 (Valid) 8 Error DC pos Q8 (Status) 7 Error DC pos Q6 (Valid) 6 Error DC pos Q6 (Status) 5 Error DC pos Q5 (Valid) 4 Error DC pos Q5 (Status) 3 Error DC pos Q01 (Valid) 2 Error DC pos Q01 (Status) 1 Error DC pos Q1 (Valid) 0 Error DC pos Q1 (Status)

Real-Time Device Data Stored in PLC (7SJ531) (Continued)

Function	Register Location in PLC Block	Range or Contents
General Status Word 6:[1]	21	**Bit** **Contents** 15 DC-Q10 pos (Valid) 14 DC-Q10 pos (Status) 13 DC-Q8 pos (Valid) 12 DC-Q8 pos (Status) 11 DC-Q6 pos (Valid) 10 DC-Q6 pos (Status) 9 DC-Q5 pos (Valid) 8 DC-Q5 pos (Status) 7 DC-Q01 pos (Valid) 6 DC-Q01 pos (Status) 5 DC-Q1 pos (Valid) 4 DC-Q1 pos (Status) 3 CB-Q0 pos (Valid) 2 CB-Q0 pos (Status) 1 Error DC pos Q2 (Valid) 0 Error DC pos Q2 (Status)
General Status Word 7:[1]	22	**Bit** **Contents** 15 Starting Time Supervision Active (Valid) 14 Starting Time Supervision Active (Status) 13 59-Overvoltage protection is ACTIVE (Valid) 12 59-Overvoltage protection is ACTIVE (Status) 11 27-Undervoltage protection is ACTIVE (Valid) 10 27-Undervoltage protection is ACTIVE (Status) 9 46-Negative seq. is ACTIVE (Valid) 8 46-Negative seq. is ACTIVE (Status) 7 Motor start protection is ACTIVE (Valid) 6 Motor start protection is ACTIVE (Status) 5 DC-Q2 pos (Valid) 4 DC-Q2 pos (Status) 3 DC-Q16 pos (Valid) 2 DC-Q16 pos (Status) 1 DC-Q15 pos (Valid) 0 DC-Q15 pos (Status)
General Status Word 8:[1]	23	**Bit** **Contents** 2–15 Not Used 1 Trip Circuit Interrupted (Valid) 0 Trip Circuit Interrupted (Status)
Number of Last Fault	24	0…32767, 0 = no faults
Fault Date/Time (ms)	25	0…59999 (ms)
Fault Date/Time (h/m)	26	High byte: HH (0…23), Low byte: MM (0…59)
Fault Date/Time (m/d)	27	High byte: MM (1…12); Low byte: DD (1…31)
Fault Date/Time (y)	28	Year: YY (00…99)
Interrupted current: Phase L1 (I/I_n)	29	ms since fault (-1 = no occurrence)
Interrupted current: Phase L1 (I/I_n)	30	Low word
Interrupted current: Phase L1 (I/I_n)	31	High word
Interrupted current: Phase L2 (I/I_n)	32	ms since fault (-1 = no occurrence)
Interrupted current: Phase L2 (I/I_n)	33	Low word
Interrupted current: Phase L2 (I/I_n)	34	High word
Interrupted current: Phase L3 (I/I_n)	35	ms since fault (-1 = no occurrence)

Real-Time Device Data Stored in PLC (7SJ531) (Continued)

Function	Register Location in PLC Block	Range or Contents
Interrupted current: Phase L3 (I/I_n)	36	Low word
Interrupted current: Phase L3 (I/I_n)	37	High word
Fault Reactance, Ohm sec.	38	ms since fault (-1 = no occurrence)
Fault Reactance, Ohm sec.	39	Low word
Fault Reactance, Ohm sec.	40	High word
Distance to fault in km	41	ms since fault (-1 = no occurrence)
Distance to fault in km	42	Low word
Distance to fault in km	43	High word
Distance to fault in miles	44	ms since fault (-1 = no occurrence)
Distance to fault in miles	45	Low word
Distance to fault in miles	46	High word
Magnitude of earth current	47	ms since fault (-1 = no occurrence)
Magnitude of earth current	48	Low word
Magnitude of earth current	49	High word
Active component of earth current	50	ms since fault (-1 = no occurrence)
Active component of earth current	51	Low word
Active component of earth current	52	High word
Reactive component of earth current	53	ms since fault (-1 = no occurrence)
Reactive component of earth current	54	Low word
Reactive component of earth current	55	High word
Fault in the power system	56	ms since fault (-1 = no fault)
General Close of Device	57	ms since fault (-1 = no fault)
General Trip of Device	59	ms since fault (-1 = no fault)
General Trip of Protection	59	ms since fault (-1 = no fault)
Trip by displacement voltage stage	60	ms since fault (-1 = no fault)
Trip by sensitive IEE>> stage	61	ms since fault (-1 = no fault)
Trip by sensitive IEE> stage	62	ms since fault (-1 = no fault)
Trip by sensitive IEEp stage	63	ms since fault (-1 = no fault)
Trip by Breaker Failure Protection	64	ms since fault (-1 = no fault)
Thermal overload protection trip	65	ms since fault (-1 = no fault)
O/C fault detection phase 1	66	ms since fault (-1 = no fault)
O/C fault detection phase 2	67	ms since fault (-1 = no fault)
O/C fault detection phase 3	68	ms since fault (-1 = no fault)
O/C fault detection earth	69	ms since fault (-1 = no fault)
O/C Fault Detection L1 only	70	ms since fault (-1 = no fault)
O/C Fault Detection L1-E	71	ms since fault (-1 = no fault)

Real-Time Device Data Stored in PLC (7SJ531) (Continued)

Function	Register Location in PLC Block	Range or Contents
O/C Fault Detection L2 only	72	ms since fault (-1 = no fault)
O/C Fault Detection L2-E	73	ms since fault (-1 = no fault)
O/C Fault Detection L1-L2	74	ms since fault (-1 = no fault)
O/C Fault Detection L1-L2-E	75	ms since fault (-1 = no fault)
O/C Fault Detection L3	76	ms since fault (-1 = no fault)
O/C Fault Detection L3-E	77	ms since fault (-1 = no fault)
O/C Fault Detection L1-L3	78	ms since fault (-1 = no fault)
O/C Fault Detection L1-L3-E	79	ms since fault (-1 = no fault)
O/C Fault Detection L2-L3	80	ms since fault (-1 = no fault)
O/C Fault Detection L2-L3-E	81	ms since fault (-1 = no fault)
O/C Fault Detection L1-L2-L3	82	ms since fault (-1 = no fault)
O/C Fault Detection L1-L2-L3-E	83	ms since fault (-1 = no fault)
O/C Fault Detection E only	84	ms since fault (-1 = no fault)
O/C General Trip Command	85	ms since fault (-1 = no fault)
50HS-Phase high-set element TRIP	86	ms since fault (-1 = no fault)
50-Phase inst. element TRIP	87	ms since fault (-1 = no fault)
51-Phase time element TRIP	88	ms since fault (-1 = no fault)
50NHS-Ground high-set element TRIP	89	ms since fault (-1 = no fault)
50N-Ground inst. element TRIP	90	ms since fault (-1 = no fault)
51N-Ground time element TRIP	91	ms since fault (-1 = no fault)
67HS-Dir. Phase High-Set TRIP	92	ms since fault (-1 = no fault)
67-Dir. phase inst. element TRIP	93	ms since fault (-1 = no fault)
67T-Dir. phase time element TRIP	94	ms since fault (-1 = no fault)
67HS-Dir. Ground High-Set TRIP	95	ms since fault (-1 = no fault)
67NT-Dir. ground time element TRIP	96	ms since fault (-1 = no fault)
Dir. O/C fault detection phase L1	97	ms since fault (-1 = no fault)
Dir. O/C fault detection phase L2	98	ms since fault (-1 = no fault)
Dir. O/C fault detection phase L3	99	ms since fault (-1 = no fault)
Dir. O/C fault detection earth	100	ms since fault (-1 = no fault)
Dir. O/C protection TRIP	101	ms since fault (-1 = no fault)
46-Negative seq. protection TRIP	102	ms since fault (-1 = no fault)
27-1 Undervoltage first step TRIP	103	ms since fault (-1 = no fault)
27-2 Undervoltage second step TRIP	104	ms since fault (-1 = no fault)

Real-Time Device Data Stored in PLC (7SJ531) (Continued)

Function	Register Location in PLC Block	Range or Contents
59-Overvoltage TRIP	105	ms since fault (-1 = no fault)
Trip by supervision of starting time	106	ms since fault (-1 = no fault)
Rotor Locked	107	ms since fault (-1 = no fault)
Reserved	108–111	For future expansion

1. Status information for each parameter is transmitted in two bits. The status bit indicates status (true = 1, false = 0) for the parameter and the valid bit indicates that the device has successfully updated the value in the status bit (true = 1, false = 0).

Device Command Data Retrieved From PLC (7SJ531)

First Command Word (Command Word)	Additional Command Words (Data or Value)
0 = No command	Unused
1 = Time Sync	2nd Word: Time [ms] - (0-59999) 3rd Word: Time [h/m] - high byte: HH (1-24), low byte: MM (0-59) 4th Word: Date [m/d] - high byte: MM (1-12), low byte: DD (1-31) 5th Word: Date [y] - YY (00-99)
2 = Reset LEDs	Unused
3 = Activate Parameter Set A	Unused
4 = Activate Parameter Set B	Unused
5 = Activate Parameter Set C	Unused
6 = Activate Parameter Set D	Unused
10 = General Command	2nd Word: [Typ] in high byte, [Inf] in low byte

C19 Device Type: 7SJ600

Real-Time Device Data Stored in PLC (7SJ600)

Function	Register Location in PLC Block	Range or Contents
Phase A current (IL1)	0	%
Phase B current (IL2)	1	%
Phase C current (IL3)	2	%
Operating Temperature (Theta)	3	%
Binary Inputs 1-3	4	Refer to **Section 4.7**
Signal Relays and Trip Relays	5	Refer to **Section 4.7**
LED Indicators 1-4	6	Refer to **Section 4.7**
General Status Word 1:[1]	7	**Bit** **Contents** 15 >Overcurrent protection: blockstage IE>> (Valid) 14 >Overcurrent protection: blockstage IE>> (Status) 13 >Overcurrent protection: blockstage Ip (Valid) 12 >Overcurrent protection: blockstage Ip (Status) 11 >Overcurrent protection: blockstage I> (Valid) 10 >Overcurrent protection: blockstage I> (Status) 9 >Overcurrent protection: blockstage I>> (Valid) 8 >Overcurrent protection: blockstage I>> (Status) 7 Thermal overload prot.: Thermal warning (Valid) 6 Thermal overload prot.: Thermal warning (Status) 5 Thermal overload protection is active (Valid) 4 Thermal overload protection is active (Status) 3 >Circuit breaker closed (Valid) 2 >Circuit breaker closed (Status) 1 Any protection operative (Valid) 0 Any protection operative (Status)
General Status Word 2:[1]	8	**Bit** **Contents** 15 AR: Auto-reclose in progress (Valid) 14 AR: Auto-reclose in progress (Status) 13 AR: Auto reclosure is active (Valid) 12 AR: Auto reclosure is active (Status) 11 O/C fault detection earth (Valid) 10 O/C fault detection earth (Status) 9 O/C fault detection phase L3 (Valid) 8 O/C fault detection phase L3 (Status) 7 O/C fault detection phase L2 (Valid) 6 O/C fault detection phase L2 (Status) 5 O/C fault detection phase L1 (Valid) 4 O/C fault detection phase L1 (Status) 3 >Overcurrent protection: blockstage IEp (Valid) 2 >Overcurrent protection: blockstage IEp (Status) 1 >Overcurrent protection: blockstage IE> (Valid) 0 >Overcurrent protection: blockstage IE> (Status)
General Status Word 3:[1]	9	**Bit** **Contents** 15 >Trip circuit supervision: CB aux. (Valid) 14 >Trip circuit supervision: CB aux. (Status) 13 >Trip circuit supervision: Trip relay (Valid) 12 >Trip circuit supervision: Trip relay (Status) 11 Supervision of starting time active (Valid) 10 Supervision of starting time active (Status) 9 >Starting time supervision: Block stage (Valid) 8 >Starting time supervision: Block stage (Status) 7 >inst. high set prot.: Block stage I>>> (Valid) 6 >inst. high set prot.: Block stage I>>> (Status) 5 Unbalanced load protection is active (Valid) 4 Unbalanced load protection is active (Status) 3 >Reversed phase rotation (Valid) 2 >Reversed phase rotation (Status) 1 AR: Reclosure blocked (Valid) 0 AR: Reclosure blocked (Status)

Real-Time Device Data Stored in PLC (7SJ600) (Continued)

Function	Register Location in PLC Block	Range or Contents
General Status Word 4:[1]	10	**Bit** **Contents** 2–15 Not Used 1 Trip circuit supervision active (Valid) 0 Trip circuit supervision active (Status)
Number of Last Fault	11	0…32767, 0 = no faults
Fault Date/Time (ms)	12	0…59999 (ms)
Fault Date/Time (h/m)	13	High byte: HH (0…23), Low byte: MM (0…59)
Fault Date/Time (m/d)	14	High byte: MM (1…12); Low byte: DD (1…31)
Fault Date/Time (y)	15	Year: YY (00…99)
Interrupted current: Phase L1 (I/I_n)	16	ms since fault (-1 = no occurrence)
Interrupted current: Phase L1 (I/I_n)	17	Low word
Interrupted current: Phase L1 (I/I_n)	18	High word
Interrupted current: Phase L2 (I/I_n)	19	ms since fault (-1 = no occurrence)
Interrupted current: Phase L2 (I/I_n)	20	Low word
Interrupted current: Phase L2 (I/I_n)	21	High word
Interrupted current: Phase L3 (I/I_n)	22	ms since fault (-1 = no occurrence)
Interrupted current: Phase L3 (I/I_n)	23	Low word
Interrupted current: Phase L3 (I/I_n)	24	High word
Fault in the power system	25	ms since fault (-1 = no fault)
General Trip of Device	26	ms since fault (-1 = no occurrence)
Thermal overload prot.: Thermal warning	27	ms since fault (-1 = no occurrence)
Thermal overload protection trip	28	ms since fault (-1 = no occurrence)
O/C Fault Detection L1 only	29	ms since fault (-1 = no occurrence)
O/C Fault Detection L1-E	30	ms since fault (-1 = no occurrence)
O/C Fault Detection L2 only	31	ms since fault (-1 = no occurrence)
O/C Fault Detection L2-E	32	ms since fault (-1 = no occurrence)
O/C Fault Detection L1-L2	33	ms since fault (-1 = no occurrence)
O/C Fault Detection L1-L2-E	34	ms since fault (-1 = no occurrence)
O/C Fault Detection L3	35	ms since fault (-1 = no occurrence)
O/C Fault Detection L3-E	36	ms since fault (-1 = no occurrence)
O/C Fault Detection L1-L3	37	ms since fault (-1 = no occurrence)
O/C Fault Detection L1-L3-E	38	ms since fault (-1 = no occurrence)
O/C Fault Detection L2-L3	39	ms since fault (-1 = no occurrence)
O/C Fault Detection L2-L3-E	40	ms since fault (-1 = no occurrence)
O/C Fault Detection L1-L2-L3	41	ms since fault (-1 = no occurrence)
O/C Fault Detection L1-L2-L3-E	42	ms since fault (-1 = no occurrence)

Real-Time Device Data Stored in PLC (7SJ600) (Continued)

Function	Register Location in PLC Block	Range or Contents
O/C Fault Detection E only	43	ms since fault (-1 = no occurrence)
O/C protection I>> phase Trip	44	ms since fault (-1 = no occurrence)
O/C protection I> phase Trip	45	ms since fault (-1 = no occurrence)
O/C protection Ip phase Trip	46	ms since fault (-1 = no occurrence)
O/C protection IE>> earth Trip	47	ms since fault (-1 = no occurrence)
O/C protection IE> earth Trip	48	ms since fault (-1 = no occurrence)
O/C protection IEp earth Trip	49	ms since fault (-1 = no occurrence)
AR: Close command from auto-reclose	50	ms since fault (-1 = no occurrence)
AR: Definitive trip	51	ms since fault (-1 = no occurrence)
Neg. seq. I. (I2) prot.: Trip	52	ms since fault (-1 = no occurrence)
O/C protection I>>> phase trip	53	ms since fault (-1 = no occurrence)
Supervision of starting time trip	54	ms since fault (-1 = no occurrence)
CT Primary	55	0-50000
CT Secondary	56	1 or 5
Reserved	57-60	For Future Expansion

1. Status information for each parameter is transmitted in two bits. The status bit indicates status (true = 1, false = 0) for the parameter and the valid bit indicates that the device has successfully updated the value in the status bit (true = 1, false = 0).

Device Command Data Retrieved From PLC (7SJ600)

First Command Word (Command Word)	Additional Command Words (Data or Value)
0 = No command	Unused
1 = Time Sync	2nd Word: Time [ms] - (0-59999) 3rd Word: Time [h/m] - high byte: HH (1-24), low byte: MM (0-59) 4th Word: Date [m/d] - high byte: MM (1-12), low byte: DD (1-31) 5th Word: Date [y] - YY (00-99)
2 = Reset LEDs	Unused

C.20 Device Type: 7UT512

Real-Time Device Data Stored in PLC (7UT512)

Function	Register Location in PLC Block	Range or Contents
Operat. meas. current L1 side 1 (I1_L1)	0	%
Operat. meas. current L2 side 1 (I1_L2)	1	%
Operat. meas. current L1 side 3 (I1_L3)	2	%
Operat. meas. current L1 side 2 (I2_L1)	3	%
Operat. meas. current L2 side 2 (I2_L2)	4	%
Operat. meas. current L3 side 2 (I2_L3)	5	%
Operat. meas. current L1 side 3 (I3_L1)	6	%
Operat. meas. current L2 side 3 (I3_L2)	7	%
Operat. meas. current L3 side 3 (I3_L3)	8	%
Operat. meas. current IA	9	%
Operat. meas. current IB	10	%
General Status Word 1:[1]	11	**Bit** **Contents** 15 Parameter set C is active (Valid) 14 Parameter set C is active (Status) 13 Parameter set B is active (Valid) 12 Parameter set B is active (Status) 11 Parameter set A is active (Valid) 10 Parameter set A is active (Status) 9 Device operative/healthy (Valid) 8 Device operative/healthy (Status) 7 >User defined annunciation 4 (Valid) 6 >User defined annunciation 4 (Status) 5 >User defined annunciation 3 (Valid) 4 >User defined annunciation 3 (Status) 3 >User defined annunciation 2 (Valid) 2 >User defined annunciation 2 (Status) 1 >User defined annunciation 1 (Valid) 0 >User defined annunciation 1 (Status)
General Status Word 2:[1]	12	**Bit** **Contents** 15 Thermal overload prot.2: Current Warn. (Valid) 14 Thermal overload prot.2: Current Warn. (Status) 13 Thermal overload protection 2 active (Valid) 12 Thermal overload protection 2 active (Status) 11 Thermal overload prot.1: Current Warn. (Valid) 10 Thermal overload prot.1: Current Warn. (Status) 9 Thermal overload protection 1 active (Valid) 8 Thermal overload protection 1 active (Status) 7 >Trip stage from Buchholz protection (Valid) 6 >Trip stage from Buchholz protection (Status) 5 Measured value supervision of currents (Valid) 4 Measured value supervision of currents (Status) 3 General internal failure of device (Valid) 2 General internal failure of device (Status) 1 Parameter set D is active (Valid) 0 Parameter set D is active (Status)

Real-Time Device Data Stored in PLC (7UT512) (Continued)

Function	Register Location in PLC Block	Range or Contents
General Status Word 3:[1]	13	**Bit** **Contents** 8–15 Not Used 7 Differential protection is active (Valid) 6 Differential protection is active (Status) 5 External trip 2 is active (Valid) 4 External trip 2 is active (Status) 3 External trip 1 is active (Valid) 2 External trip 1 is active (Status) 1 Back-up overcurrent prot. is active (Valid) 0 Back-up overcurrent prot. is active (Status)
Number of Last Fault	14	0…32767, 0 = no faults
Fault Date/Time (ms)	15	0…59999 (ms)
Fault Date/Time (h/m)	16	High byte: HH (0…23), Low byte: MM (0…59)
Fault Date/Time (m/d)	17	High byte: MM (1…12); Low byte: DD (1…31)
Fault Date/Time (y)	18	Year: YY (00…99)
Diff. Curr. Of L1 at Trip (fundamental)	19	ms since fault (-1 = no occurrence)
Diff. Curr. Of L1 at Trip (fundamental)	20	Low word
Diff. Curr. Of L1 at Trip (fundamental)	21	High word
Diff. Curr. Of L2 at Trip (fundamental)	22	ms since fault (-1 = no occurrence)
Diff. Curr. Of L2 at Trip (fundamental)	23	Low word
Diff. Curr. Of L2 at Trip (fundamental)	24	High word
Diff. Curr. Of L3 at Trip (fundamental)	25	ms since fault (-1 = no occurrence)
Diff. Curr. Of L3 at Trip (fundamental)	26	Low word
Diff. Curr. Of L3 at Trip (fundamental)	27	High word
Restr. Curr. Of L1 at Trip (average DC)	28	ms since fault (-1 = no occurrence)
Restr. Curr. Of L1 at Trip (average DC)	29	Low word
Restr. Curr. Of L1 at Trip (average DC)	30	High word
Restr. Curr. Of L2 at Trip (average DC)	31	ms since fault (-1 = no occurrence)
Restr. Curr. Of L2 at Trip (average DC)	32	Low word
Restr. Curr. Of L2 at Trip (average DC)	33	High word
Restr. Curr. Of L3 at Trip (average DC)	34	ms since fault (-1 = no occurrence)
Restr. Curr. Of L3 at Trip (average DC)	35	Low word
Restr. Curr. Of L3 at Trip (average DC)	36	High word
Fault in the power system	37	ms since fault (-1 = no fault)

Real-Time Device Data Stored in PLC (7UT512) (Continued)

Function	Register Location in PLC Block	Range or Contents
General Trip of Device	38	ms since fault (-1 = no occurrence)
Trip by thermal overload protection 1	39	ms since fault (-1 = no occurrence)
Trip by thermal overload protection 2	40	ms since fault (-1 = no occurrence)
Back-up Overcurrent: General Trip	41	ms since fault (-1 = no occurrence)
External Trip 1: General Trip	42	ms since fault (-1 = no occurrence)
External Trip 2: General Trip	43	ms since fault (-1 = no occurrence)
Diff. Prot.: Blocked by harmonics L1	44	ms since fault (-1 = no occurrence)
Diff. Prot.: Blocked by harmonics L2	45	ms since fault (-1 = no occurrence)
Diff. Prot.: Blocked by harmonics L3	46	ms since fault (-1 = no occurrence)
Differential Protection: General Trip	47	ms since fault (-1 = no occurrence)
Differential Protection: L1	48	ms since fault (-1 = no occurrence)
Differential Protection: L2	49	ms since fault (-1 = no occurrence)
Differential Protection: L3	50	ms since fault (-1 = no occurrence)
Differential Protection: Trip by Idiff>	51	ms since fault (-1 = no occurrence)
Differential Protection: Trip by Idiff>>	52	ms since fault (-1 = no occurrence)
Reserved	53–56	For Future Expansion

1. Status information for each parameter is transmitted in two bits. The status bit indicates status (true = 1, false = 0) for the parameter and the valid bit indicates that the device has successfully updated the value in the status bit (true = 1, false = 0).

Device Command Data Retrieved From PLC (7UT512)

First Command Word (Command Word)	Additional Command Words (Data or Value)
0 = No command	Unused
1 = Time Sync	2nd Word: Time [ms] - (0-59999) 3rd Word: Time [h/m] - high byte: HH (1-24), low byte: MM (0-59) 4th Word: Date [m/d] - high byte: MM (1-12), low byte: DD (1-31) 5th Word: Date [y] - YY (00-99)
2 = Reset LEDs	Unused
3 = Activate Parameter Set A	Unused
4 = Activate Parameter Set B	Unused
5 = Activate Parameter Set C	Unused
6 = Activate Parameter Set D	Unused
10 = General Command	2nd Word: [Typ] in high byte, [Inf] in low byte

C.21 Device Type: 7UT513

Real-Time Device Data Stored in PLC (7UT513)

Function	Register Location in PLC Block	Range or Contents
Operat. meas. current L1 side 1 (I1_L1)	0	%
Operat. meas. current L2 side 1 (I1_L2)	1	%
Operat. meas. current L1 side 3 (I1_L3)	2	%
Operat. meas. current L1 side 2 (I2_L1)	3	%
Operat. meas. current L2 side 2 (I2_L2)	4	%
Operat. meas. current L3 side 2 (I2_L3)	5	%
Operat. meas. current L1 side 3 (I3_L1)	6	%
Operat. meas. current L2 side 3 (I3_L2)	7	%
Operat. meas. current L3 side 3 (I3_L3)	8	%
Operat. meas. current IA	9	%
Operat. meas. current IB	10	%
General Status Word 1:[1]	11	**Bit** **Contents** 15 Parameter set C is active (Valid) 14 Parameter set C is active (Status) 13 Parameter set B is active (Valid) 12 Parameter set B is active (Status) 11 Parameter set A is active (Valid) 10 Parameter set A is active (Status) 9 Device operative/healthy (Valid) 8 Device operative/healthy (Status) 7 >User defined annunciation 4 (Valid) 6 >User defined annunciation 4 (Status) 5 >User defined annunciation 3 (Valid) 4 >User defined annunciation 3 (Status) 3 >User defined annunciation 2 (Valid) 2 >User defined annunciation 2 (Status) 1 >User defined annunciation 1 (Valid) 0 >User defined annunciation 1 (Status)
General Status Word 2:[1]	12	**Bit** **Contents** 15 Thermal overload prot.2: Current Warn. (Valid) 14 Thermal overload prot.2: Current Warn. (Status) 13 Thermal overload protection 2 active (Valid) 12 Thermal overload protection 2 active (Status) 11 Thermal overload prot.1: Current Warn. (Valid) 10 Thermal overload prot.1: Current Warn. (Status) 9 Thermal overload protection 1 active (Valid) 8 Thermal overload protection 1 active (Status) 7 >Trip stage from Buchholz protection (Valid) 6 >Trip stage from Buchholz protection (Status) 5 Measured value supervision of currents (Valid) 4 Measured value supervision of currents (Status) 3 General internal failure of device (Valid) 2 General internal failure of device (Status) 1 Parameter set D is active (Valid) 0 Parameter set D is active (Status)

Real-Time Device Data Stored in PLC (7UT513) (Continued)

Function	Register Location in PLC Block	Range or Contents
General Status Word 3:[1]	13	**Bit** **Contents** 12–15 Not Used 11 Transformer tank protection is active (Valid) 10 Transformer tank protection is active (Status) 9 Restricted earth fault is active (Valid) 8 Restricted earth fault is active (Status) 7 Differential protection is active (Valid) 6 Differential protection is active (Status) 5 External trip 2 is active (Valid) 4 External trip 2 is active (Status) 3 External trip 1 is active (Valid) 2 External trip 1 is active (Status) 1 Back-up overcurrent prot. is active (Valid) 0 Back-up overcurrent prot. is active (Status)
Number of Last Fault	14	0…32767, 0 = no faults
Fault Date/Time (ms)	15	0…59999 (ms)
Fault Date/Time (h/m)	16	High byte: HH (0…23), Low byte: MM (0…59)
Fault Date/Time (m/d)	17	High byte: MM (1…12); Low byte: DD (1…31)
Fault Date/Time (y)	18	Year: YY (00…99)
Diff. Curr. Of L1 at Trip (fundamental)	19	ms since fault (-1 = no occurrence)
Diff. Curr. Of L1 at Trip (fundamental)	20	Low word
Diff. Curr. Of L1 at Trip (fundamental)	21	High word
Diff. Curr. Of L2 at Trip (fundamental)	22	ms since fault (-1 = no occurrence)
Diff. Curr. Of L2 at Trip (fundamental)	23	Low word
Diff. Curr. Of L2 at Trip (fundamental)	24	High word
Diff. Curr. Of L3 at Trip (fundamental)	25	ms since fault (-1 = no occurrence)
Diff. Curr. Of L3 at Trip (fundamental)	26	Low word
Diff. Curr. Of L3 at Trip (fundamental)	27	High word
Restr. Curr. Of L1 at Trip (average DC)	28	ms since fault (-1 = no occurrence)
Restr. Curr. Of L1 at Trip (average DC)	29	Low word
Restr. Curr. Of L1 at Trip (average DC)	30	High word
Restr. Curr. Of L2 at Trip (average DC)	31	ms since fault (-1 = no occurrence)
Restr. Curr. Of L2 at Trip (average DC)	32	Low word
Restr. Curr. Of L2 at Trip (average DC)	33	High word
Restr. Curr. Of L3 at Trip (average DC)	34	ms since fault (-1 = no occurrence)
Restr. Curr. Of L3 at Trip (average DC)	35	Low word

Real-Time Device Data Stored in PLC (7UT513) (Continued)

Function	Register Location in PLC Block	Range or Contents
Restr. Curr. Of L3 at Trip (average DC)	36	High word
Restr. Earth Flt.: Value D at Trip	37	ms since fault (-1 = no occurrence)
Restr. Earth Flt.: Value D at Trip	38	Low word
Restr. Earth Flt.: Value D at Trip	39	High word
Restr. Earth Flt.: Value S at Trip	40	ms since fault (-1 = no occurrence)
Restr. Earth Flt.: Value S at Trip	41	Low word
Restr. Earth Flt.: Value S at Trip	42	High word
Transformer Tank Prot.: Value at Trip	43	ms since fault (-1 = no occurrence)
Transformer Tank Prot.: Value at Trip	44	Low word
Transformer Tank Prot.: Value at Trip	45	High word
Fault in the power system	46	ms since fault (-1 = no fault)
General Trip of Device	47	ms since fault (-1 = no occurrence)
Trip by thermal overload protection 1	48	ms since fault (-1 = no occurrence)
Trip by thermal overload protection 2	49	ms since fault (-1 = no occurrence)
Back-up Overcurrent: General Trip	50	ms since fault (-1 = no occurrence)
External Trip 1: General Trip	51	ms since fault (-1 = no occurrence)
External Trip 2: General Trip	52	ms since fault (-1 = no occurrence)
Diff. Prot.: Blocked by harmonics L1	53	ms since fault (-1 = no occurrence)
Diff. Prot.: Blocked by harmonics L2	54	ms since fault (-1 = no occurrence)
Diff. Prot.: Blocked by harmonics L3	55	ms since fault (-1 = no occurrence)
Differential Protection: General Trip	56	ms since fault (-1 = no occurrence)
Differential Protection: L1	57	ms since fault (-1 = no occurrence)
Differential Protection: L2	58	ms since fault (-1 = no occurrence)
Differential Protection: L3	59	ms since fault (-1 = no occurrence)
Differential Protection: Trip by Idiff>	60	ms since fault (-1 = no occurrence)
Differential Protection: Trip by Idiff>>	61	ms since fault (-1 = no occurrence)
Restr. Earth Flt.: General Trip	62	ms since fault (-1 = no occurrence)
Transformer Tank Prot.: General Trip	63	ms since fault (-1 = no occurrence)
Reserved	64–67	For Future Expansion

1. Status information for each parameter is transmitted in two bits. The status bit indicates status (true = 1, false = 0) for the parameter and the valid bit indicates that the device has successfully updated the value in the status bit (true = 1, false = 0).

Device Command Data Retrieved From PLC (7UT513)

First Command Word (Command Word)	Additional Command Words (Data or Value)
0 = No command	Unused
1 = Time Sync	2nd Word: Time [ms] - (0-59999) 3rd Word: Time [h/m] - high byte: HH (1-24), low byte: MM (0-59) 4th Word: Date [m/d] - high byte: MM (1-12), low byte: DD (1-31) 5th Word: Date [y] - YY (00-99)
2 = Reset LEDs	Unused
3 = Activate Parameter Set A	Unused
4 = Activate Parameter Set B	Unused
5 = Activate Parameter Set C	Unused
6 = Activate Parameter Set D	Unused
10 = General Command	2nd Word: [Typ] in high byte, [Inf] in low byte

Appendix C: Device Data Format

D Warranty/Notices

Siemens Energy & Automation, Inc. warrants that all equipment purchased hereunder is warranted on a "RETURN TO FACTORY" basis against all defects in workmanship and materials under normal and proper use and service in its unmodified condition for a period of one (1) year from the date of initial shipment. Siemens Energy & Automation, Inc.'s sole obligation under this warranty shall be limited to furnishing parts and labor to remedy such defects; either, at the option of Siemens Energy & Automation, Inc., by replacing or repairing any defective parts which are returned to Siemens Energy & Automation, Inc. factory or by making available at a Purchaser designated facility a repaired or replaced part. All replaced equipment shall become the property of Siemens Energy & Automation, Inc. The cost of freight to and from Siemens Energy & Automation,Inc. Siemens Energy & Automation, Inc. will be borne by the Purchaser. If Siemens Energy & Automation, Inc. determines that the equipment returned to it for warranty correction is not defective, as herein defined, Purchaser shall pay Siemens Energy & Automation, Inc., all costs of service, parts, handling and transportation.

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Appendix D: Warranty/Notices

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